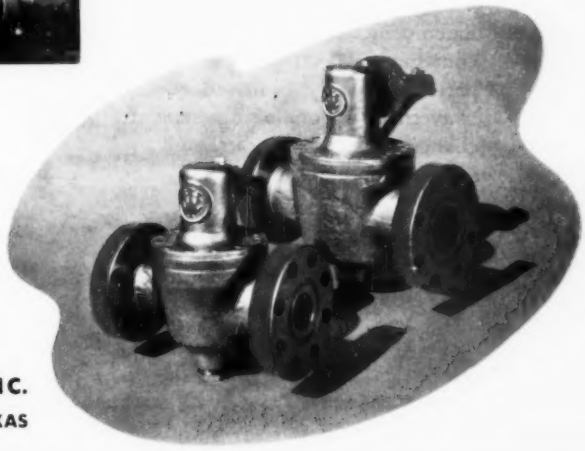
the OIL AND GAS JOURNAL

In this issue: THE STORY OF A GREAT, NEW VALVE—Pages 6, 7

THE Cameron
NON-LUBRICATED
LIFT-PLUG VALVE

Here is truly a noteworthy advancement in valve design. Employing mechanical features found in no other valve, this new Cameron oilfield valve is the result of many years of engineering labor and field testing. Like the now famous Cameron pressure-operated blowout preventers, flex-seal mud line valves and other Cameron products which have become bywords in the industry, Cameron Non-Lubricated Lift-Plug Valves will also make oilfield equipment history.

- NON-LUBRICATED
- PRESSURE SEALING
- LIFT-PLUG DESIGN
- RENEWABLE SEAT AND PLUG — Corrosion resistant
- MAY BE REPAIRED IN THE FIELD
- EASY OPERATION
- FORGED STEEL THROUGHOUT



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PRICE 50 CENTS TABLE OF CONTENTS PAGE 25 **DECEMBER 29, 1949**

ROCKWELL-EMCO
ORIFICE METER GAUGES

WITH ROCKWELL CHART DRIVES

SERVICE-EASE
ACCESSIBILITY
FLEXIBILITY
Save you money

The entire meter can be dismantled or built up using common, everyday tools.

You get more than just a precision measuring instrument when you buy Rockwell-Emco orifice meter gauges. You get a strongly built, soundly engineered mechanical construction. You get the service ease of a fully accessible arrangement of working parts. And you gain the added advantage of flexibility—for this meter alone quickly converts to any one of four standard differential ranges by simply interchanging high pressure chambers. Want more facts about the service economies of Rockwell-Emco orifice meter gauges? Then write for bulletin 1050.

ROCKWELL CHART DRIVES

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Save Time—Save Money. With this simple, rugged portable device, it is possible to save in excess of 50% of the time generally required to lubricate Lubricated Plug Valves. It will economically and efficiently handle the stiffest grades of Walworth lubricants.

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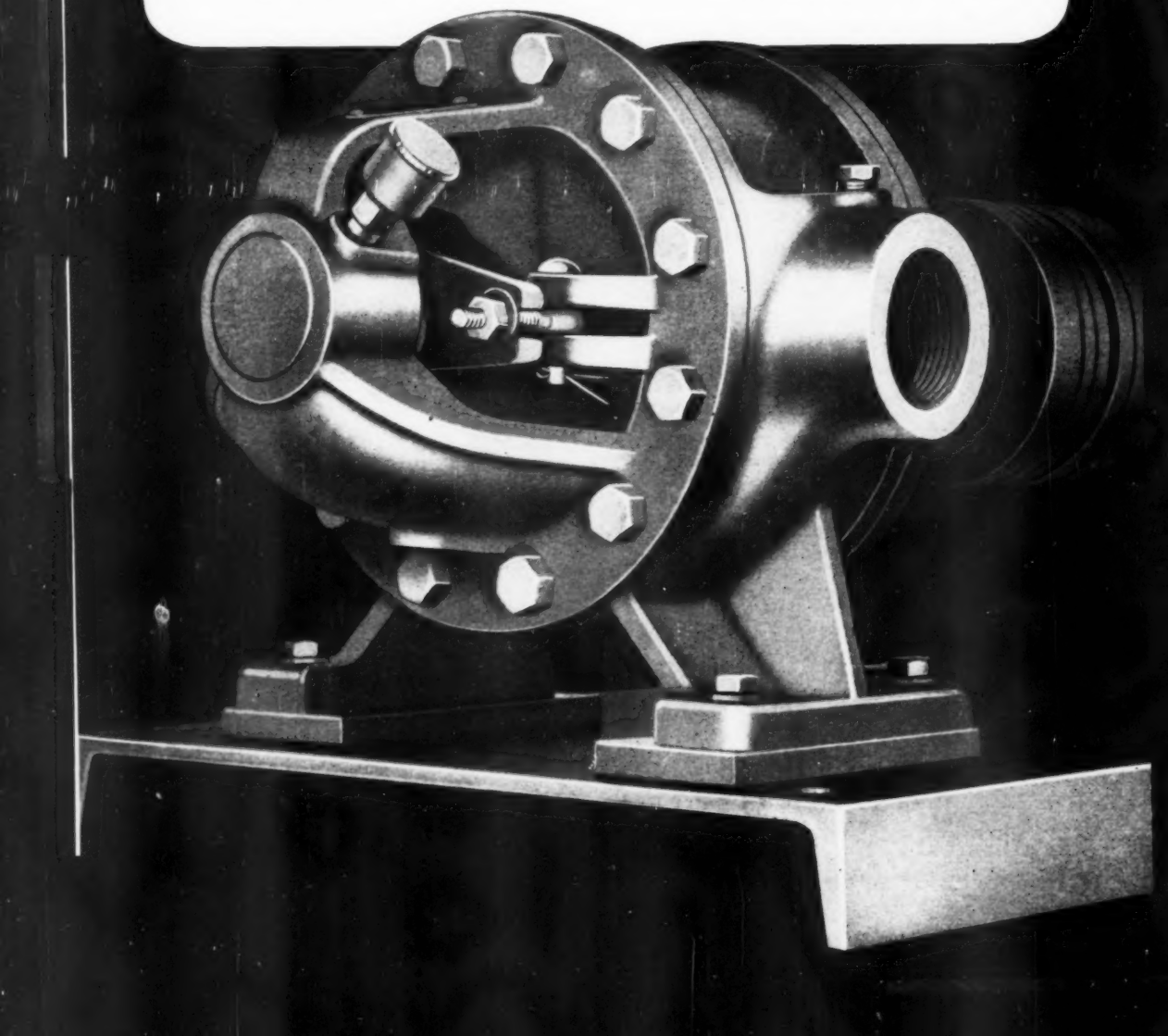

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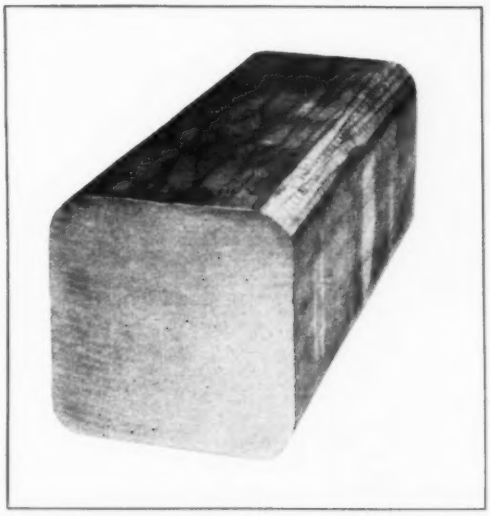

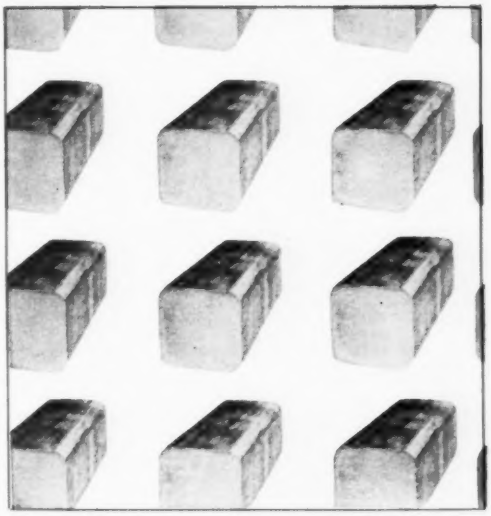

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2 — PROPER ADJUSTMENT . . . run chains snug but not fiddle string tight. A chain with excess slack and a rapid clutch may snap when picking up load and break. Too slack a chain will ride sprocket teeth and even cause chain to jump off sprockets. Adjust properly and save money!

3 — PROPER LUBRICATION . . . use good, light mineral oil only, SAE-30 or 40. Faulty lubrication kills more chains than years of normal service. Do not use a spent oil that has previously been used to lubricate an engine or pump. The presence of oil on outer chain surfaces does not necessarily mean that chain is properly lubricated. To be effective, the lubricant must penetrate between pins and bushings—constantly. To prevent corrosion, reduce friction and wear, lengthen chain and sprocket life . . . lubricate properly and save money!

4 — PROPER CLEANING . . . some chains are still operated openly without an oil bath. Such chains should be lubricated frequently and occasionally removed for thorough cleaning and lubricating. Always apply lubricant to such drives from inside of chain rather than out since centrifugal force tends to throw it off and oil must pass through chain when applied inside.

5 — PROPER SPROCKETS . . . inspect sprocket teeth at regular intervals. Worn teeth damage chain. Renew sprockets before they begin to wear badly and do not place a new chain on sprockets that are worn to any considerable extent.

6 — PROPER CHAINS . . . selection of proper chains—as well as sprockets—is the final secret to Link-Belt's "longer service with less maintenance". Drives must be suitable to power transmission required. Chain should be inspected regularly. If these pointers are observed, you'll seldom replace Link-Belt chains. Use Link-Belt chains and sprockets—and save money!

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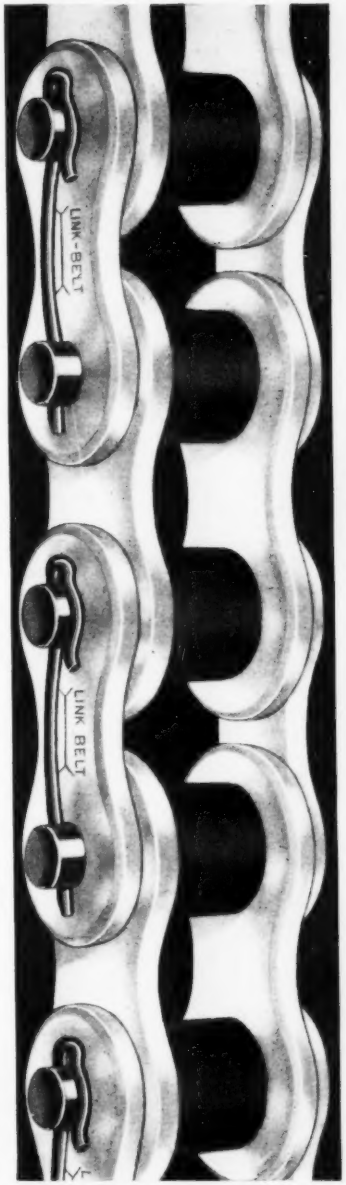

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THE Cameron NON-LUBRICATED

SETS A NEW HIGH STANDARD FOR

The Cameron Non-Lubricated Type "LP" (Lift-Plug) Valve presents a revolutionary approach to the problem of quality valve design. It combines the advantages of recognized plug, gate, and globe valves, and eliminates the generally recognized difficulties of the standard valve designs.

Need for lubrication, which is essential to the operation of the usual plug valve, and generally accepted as an improvement in gate valve design, is eliminated in the "LP" Valve for two reasons: First, a complete seal is effected when the valve is shut, because a portion of the exterior surface of the removable seat is exposed to pressure, thus permitting a pressure sealing action; and secondly, the plug is lifted straight away from the seat before rotation to prevent scoring or galling of the seating surfaces. In addition to eliminating the need for lubrication, the pressure sealing action of the seat and plug forestalls many of the difficulties experienced with conventional designs in all types of valves where distortion of the body due to pressure, temperature, or line strains ordinarily cause imperfect sealing. The lift and turn mechanism incorporated in the valve not only acts to eliminate the need for lubrication but makes possible an extraordinary ease of operation, since operating effort goes first into lifting the plug straight off the seat then into turning it while free from contact with the seat, and, finally, reseating without rotation. In all pressure ranges, the plug rotates in accurately aligned bushings to effectively prevent contact during rotation of the sealing surfaces. Since the seat is a separate piece, which may be removed from the body, it is perfectly feasible to replace both the seat and plug in the field under ordinary conditions. The separate seat and plug are normally furnished in corrosion resistant materials, and may be supplied from almost any material as required for unusual corrosive or erosive service.

A large part of the experimental program for the "LP" Valve was devoted to the development of techniques for producing all of the parts as forgings. The plug and seat, bonnet, cam, cam shaft, and cam housing are drop forgings. The press forge technique used in producing the body represents the accumulative experience gained in the production of the more complex forgings which have replaced castings in most of Cameron products.

Left—**The plug actuator is an innovation in valve design. Rotating the operating shaft clockwise three-quarters of a turn first lifts the plug, then rotates it a quarter turn to open position, then seats the plug. Counter-clockwise rotation three-quarters of a turn performs the reverse operation, lifting, turning to closed position and reseating.**

Right—**The separate seat is also a unique feature of this valve. When seated, line pressure automatically tightens the seal because the pressure is outside a portion of the seat, forcing it into tighter contact with the plug. Being separate from the valve body, the seat, as well as the plug, may be easily replaced in the field.**

LIFT-PLUG VALVE

OILFIELD VALVES

These are the features that make the Cameron Valve outstanding . . . exclusive features that will increase the efficiency of your operations, eliminate costly maintenance, and provide greater safety and convenience for your workers:

- NON-LUBRICATED—no grease of any kind required to effect a seal; also reducing chance for human error and need for maintenance.
- PRESSURE SEALING—when plug is seated, line pressure automatically forces seat into tighter engagement with plug.
- LIFT-PLUG—a novel mechanical design lifts, turns and reseats plug in continuous turn of a lever.
- RENEWABLE SEAT AND PLUG—easily replaced when damaged; permits any desired trim.
- MAY BE REPAIRED IN THE FIELD—can be completely overhauled without removal from line; no special tools or skill required.
- EASY OPERATION—requires less operating effort than other valve designs.
- FORGED STEEL—All parts, including body, are press or drop forged from specification materials.

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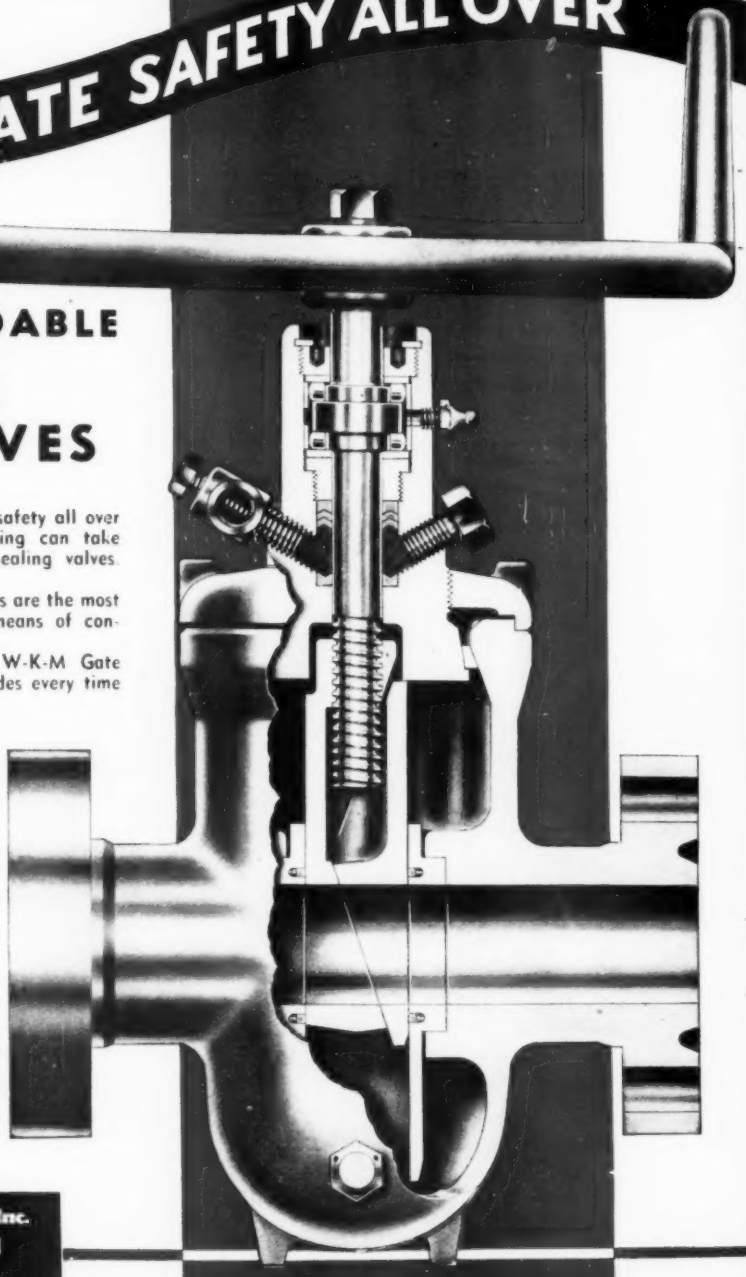
So give your Christmas Trees master-gate safety all over with dependable W-K-M Gate Valves. They are safety insurance . . . additional assurance that your well is always under control. Specify W-K-M Valves. They now control more than 80% of all high pressure wells in the world.



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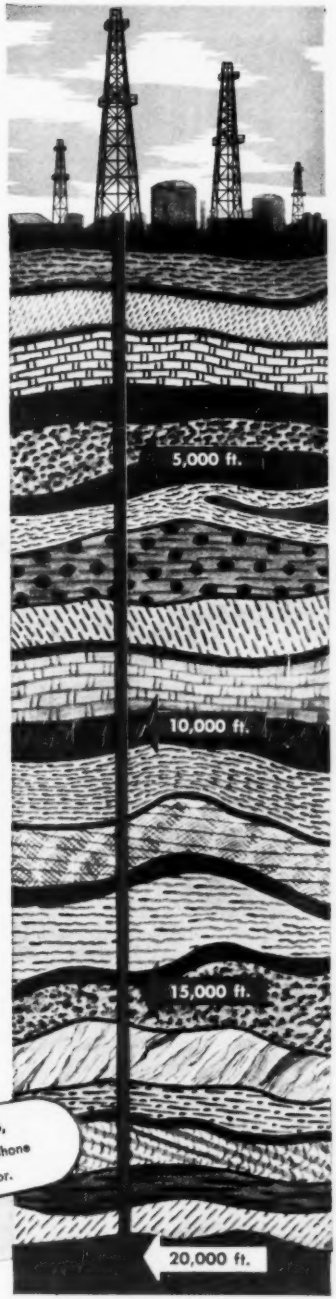

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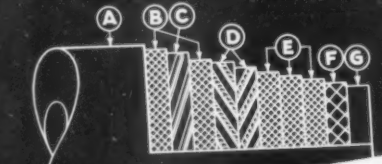

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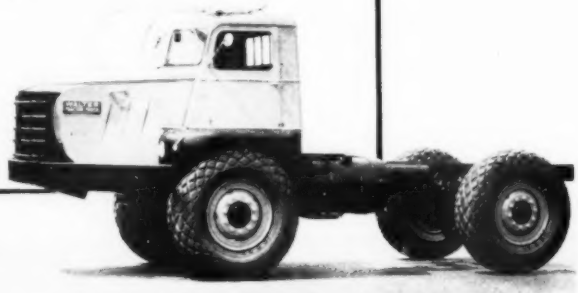

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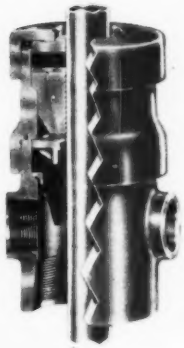

Users of the Larkin Type SR Tubing Head strip their tubing through it, flow through it for the flush life of the well, then convert it for pumping. Check the features which make it the best buy in the low pressure tubing head field.

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Cost of Industrial Eye Accidents UP *78½% SINCE 1939

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If your company is typical, every department is fighting for its share of the 1950 budget . . . and understandably. But industrial eye accidents represent a significant and *unnecessary* expense which has *no sponsor!*

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How? By an AO eye protection program which can prevent 98% of eye accidents by the wearing of the correct goggles at every eye-hazardous task. Your AO Safety Products Representative can help you install the program which can pay for itself in less than 6 months time. Ask him to call.

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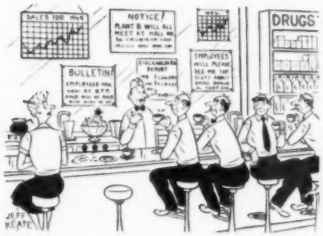

"Your boss was in and said his staff spends so much time down here, this seems the logical place for office bulletins and charts"
From the Natural Gasser, Warren Petroleum Corp.

Natural-Gas Parlay

"It seems that someone has worked out a process whereby they can, with money and ingenuity, take $10 worth of natural gas and convert it into an extra $1,000 worth of corn. . . .

"This is the way it works: natural gas is put through a complicated process from which comes 1 ton of anhydrous ammonia; this, in turn, is put through another complex operation, and emerges as 2 tons of ammonium nitrate, worth approximately $140. By spreading these 2 tons of fertilizer on 40 acres of corn, the yield is increased as much as 720 bu.—a fact proved by test. At today's prices, the additional yield would give the farmer an extra $1,000 cash crop.

"So, if you're chemically minded (and can find someone with the moola needed to put up the giant plant needed for converting the natural gas into fertilizer), you can parlay some of your extra money into some real dough. Incidentally, if you make good—let us know, we're always casting about for a way to make a fast buck."

The Line, Tennessee Gas Transmission Co.

500 Galley Slaves

"Commenting on technological development and the countless things it has made possible, a prominent American scientist has pointed out that every person in the United States is using approximately 250 hp.-hr. of energy every day. In terms of work output, this is equivalent to each man, woman, and child having at his service some 500 galley slaves of the Roman Empire period.

"Such availability of energy—about half of which comes from petroleum and natural gas—enables the average American to live abundantly compared with his counterpart anywhere else in the world. It permits him to have as necessities many material things that are looked upon as luxuries in other civilized countries."

Folder distributed by Gulf Oil Corp. and Gulf Refining Co.

Stay-Put Record?

"Six out of every 10 men employed in East Coast manufacturing units of the company, and in Standard Oil Development Co., are entitled to wear Esso emblems for varying lengths of service, starting at the 10-year level.

"Of the six men, 1.9 own 10-year buttons, 2.2 have 20-year buttons, and 1.7 possess 30-year emblems. A diminutive 0.2 of one of those statistical men has been with the company for 40 or more years. In actual numbers, emblems are owned by 6,328 male employes at the above-listed units, as opposed to 4,211 men whose service is under the 10-year mark.

"Among women employes, naturally enough, the figure is much lower. Only 14 per cent of the 838 women in the various units have accumulated enough service to win Esso service pins. Of these, 72 have 10-

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year pins, 47 have 20-year pins, and 7 have 30-year pins."

The Esso Refiner, Esso Standard Oil Co.

For Better Living

"Let's just suppose for the sake of argument that we could eliminate all government expenditures next year. Right off the bat we would save every American 25 per cent of his income which now goes for direct and indirect taxes. Part of that he would probably consume, but at least half of the total tax savings throughout the nation would probably go into productive facilities.

"Our present federal, state, and local budgets now total about 55 billions annually. So that means that nearly 30 billion extra dollars next year would go into productive facilities and new enterprises.

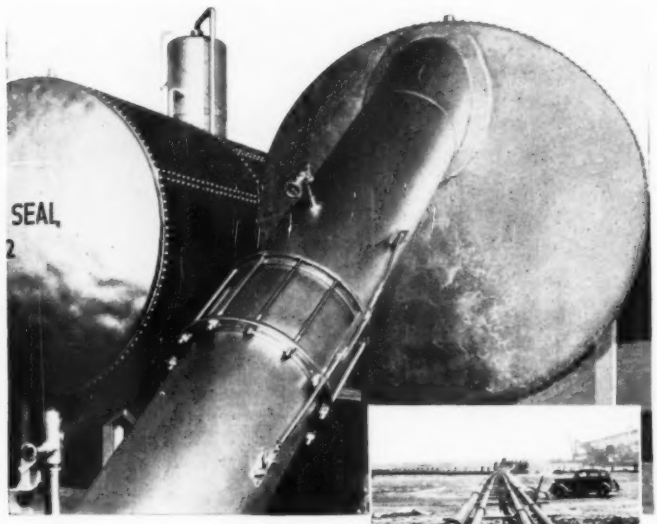
"That would make a total almost two times as large as we were able to scrape up for the purpose this year. At the same time, with this kind of expansion, we probably wouldn't have too much trouble putting 7 million government employes back to work at productive employment. So we would increase our productive labor force by 11 per cent and our total annual production by possibly twice that much. With what the average American would save in tax expense, plus what the increased production would mean in the purchasing power of his dollar, we might very easily achieve a 22 per cent increase in our standard of living in 1 year.

"Now that's a purely hypothetical and impractical proposal, but it isn't as funny as it sounds. Because the principle is valid. Obviously, we can't cut our government expenditures 100 per cent. But every 5 per cent or 10 per cent or 20 per cent that we do cut them will enable us to increase our productive capacity and our standard of living to a relative degree.

"That, in my opinion, is the only way we're ever going to make any real gains in the nation's social welfare."

Reese H. Taylor, president, Union Oil Co., addressing Town Hall audience, Los Angeles.

HANDIEST... wherever you have pipe to join



Whether it's an equipment hookup, a field line, or a terminal—anywhere you're joining pipe—the handiest, surest way to get uniformly tight pipe joints is with Dresser Couplings and Long Sleeves.

There's no pipe threading—the only tool you need is a wrench. Dressers give you a "Flexible-Tight" connection every time, day or night, rain or shine, even where pipe ends don't meet.

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Refiner's Thanks

Sir:

As temporary chairman of the executive committee of the newly organized Independent Refiners Association of America, I wish to express the association's appreciation for the editorial regarding independent refiners which appeared in the November 17 issue of your publication.

I believe you have stated the case in a clear and factual manner, and borrowing from your editorial, our new association plans "an aggressive presentation of facts and remedies . . ." as you suggested.

Thanking you for your excellent support of our stand regarding present problems, I am

Sincerely,
Harry Leyendecker,
Vice president,
Eastern States Petroleum Co., Inc.

Offshore Drilling Cost

"Offshore drilling is only one phase of the petroleum industry's constant search for more oil reserves; yet this operation alone entails the expenditure of $5,250,000 a month. Of this huge total, $1,250,000 goes into geophysical research, and $4,000,000 into drilling and developments."

K. O. M. A. Bulletin, Kansas Oil Men's Association.

Production Spur

"Surely one of the greatest spurs to production is the need for a worker to earn his own security both present and future. The one thing to encourage loafing is the knowledge that security is available regardless of effort."

Donald P. Jones, Sun Oil Co., addressing Buffalo Boosters Club, Buffalo, N. Y.

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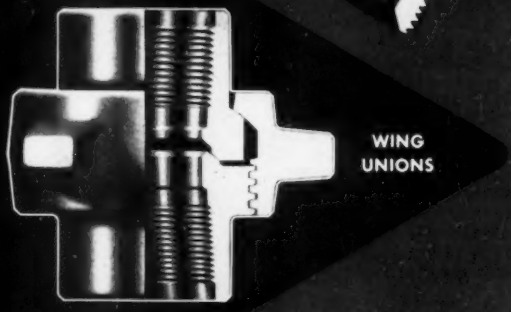

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P. O. BOX 3091 HOUSTON, TEXAS

PENETRATION

doesn't mean a thing

UNLESS

it's in the

RIGHT PLACE!

That's certainly obvious—just as obvious is the fact that you don't bring up any oil when you perforate for production and have the shots go into shale or other undesirable formations. Guarding against that is one of the greatest features of Lane-Wells Better Perforating—a measurement accuracy famous in every oil field as the measurement standard of the industry.

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JOURNALLY Speaking

Family Stuff

MOST every office has a Christmas party, but ours is always a special occasion because it is then that 20-year emblems are awarded to those who have managed to avoid being fired for that length of time.

This has been going on for so long that the emblems (which look deceptively like a Phi Bete key at 20 paces) flash all over the shop. If this would imply that quite a few people think this is a good place to work, the inference is correct. But it should not be inferred that everyone hereabouts is an old fogy.

Over the turkey and fixings last week, six 20-year men got their pins: C. R. Farmer, manager of our Chicago office; Ralph Saxe, composing-room foreman; Earl Kerr, mailing-room foreman; E. L. McCarty, in charge of binding machinery; S. H. Rourke, treasurer; and Pat Boyls, assistant to the press-room superintendent.

To prevent anyone from jumping at conclusions it might be explained that this Pat Boyls is not a scion of the Pat Boyle who, as the column immediately to the left states, fathered the "Organ of Oil" in 1910. That "s" on the end of his name is not a misprint.

No Comment

LEIGH McCASLIN, our ubiquitous Gulf Coast editor, gets around in the best society, and to prove it he sent in the above picture of himself and other notables, together with this caption:

"Picture of the week? I think I had better let you folks write the caption for this. It was taken at the cocktail party held in connection with the Pipe Line Contractors Association meeting in the Shamrock. My primary interest was to get a lease tip from McCarthy so I could be an oil man. However, I had no luck. I did get a statement from Jack Benny. I asked him what he thought of Bob Hope's ventures in Scurry County. He replied, and I quote: 'That guy's so lucky he could hit an oil well at the corner of Hollywood and Vine.' Of the Shamrock, Benny said: 'This is the only hotel I ever saw where you have to be shaved to get into the barber shop.' Pictured from left to right: Ye Old Gulf Coast Editor (that's coke in the glass), an unidentified equipment salesman, Carl Anderson of Anderson Brothers Corp., Jack Benny, and Glenn McCarthy (note the smile)."

Henry D. Ralph

DOWELL ACIDIZING SERVICE... Proved by a 16 year record of production increases in thousands of wells
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Look to
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What do we mean.... Dowell Service?

Service is something you can't see, smell, or touch. You can't pick it up, inspect it, test it and say, "This is good service." No—when you buy service, you buy certain intangibles that are your insurance of good performance—good service. What are these intangibles? *Knowledge, experience, dependability*—those are the things you buy . . . the things that Dowell sells.

Seventeen years ago Dowell was established in the oil fields for just one reason: to put certain chemical discoveries to work where they might best help someone. All the research at Dowell and at The Dow Chemical Company is *good* research only if it *helps* you. Dowell men are trained in that concept—Dowell equipment is designed for that purpose. It's not just the physical doing of another job, but rather the active desire to put the things research discovers to work *serving* you. It is this sincere wish to help that has given Dowell the knowledge, experience and dependability that are back of every job.

Those are the things we call Dowell Service. Those are the things you will find when you "Look To Dowell For Oil Industry Chemical Service."

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The OIL AND GAS JOURNAL

VOL. 48, NO. 34 DECEMBER 29, 1949

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Protect THOSE LOW-PRESSURE ZONES FROM CEMENT CONTAMINATION

The difficult problem of cementing a string of casing at a predetermined point above the bottom of the hole, while protecting a permeable, low-pressure zone below from cement contamination is successfully being solved by using Baker Triplex Cementing Equipment.

The features of design and construction which insure its successful performance are "tried and true" Baker principles. Baker Metal Petal Baskets have been used universally for years in many types of cementing; and the Baker "Whirler" principle long has been proved superior to jetting action, which may not only fail to prevent channeling, but may wash out cavities with resultant contamination of the cement slurry.

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ACCESSORY EQUIPMENT OPTIONAL

When it is desired to retain cement tailings inside the casing (thus preventing dilution of the cement slurry around and above the Triplex Shoe) either of two collars may be used, *as illustrated below:*

Baker Triplex Cement Baffle Collar (Product No. 137) is used when a stop for the cementing plug is desired, to retain cement tailings inside the casing.

Baker Triplex Flapper Valve Float Collar (Product No. 134 M&F) provides the safety of an additional float valve, as well as a stop for the cementing plug.

Baker Triplex Cementing Shoe, Product No. 136. Named "Triplex" because it performs a "triple" service: (1) is an efficient float shoe for running-in the casing; (2) whirls the cement slurry upward to minimize danger of channeling; (3) Metal Petal Basket expands to form a bridge which prevents cement contamination of low-pressure zones below.

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(A) Baker Triplex Cement Baffle Collar, installed a joint or two above the shoe, serves as a stop for the cementing plug. (B) A hold-down strap retains Baker Metal Petal Basket against the "TRIPLEX" Shoe while running-in. (C) Cementing Ports are covered by Tripping Valve until cementing is commenced. (E) After reaching the desired point in the hole, circulation is established through central passageway. A Tripping Ball is pumped down the hole to seat upon the Tripping Valve. Pressure is applied to shear the Tripping Valve shear screws and force the Tripping Valve downward to expose the cementing ports. (F) Shearing these screws also releases the Basket hold-down strap and allows the Metal Petal Basket to expand against the walls of the hole. (D) A resilient rubber, sleeve-type, back-pressure valve opens readily (see dotted white line) to permit passage of slurry into annulus above. Cementing then is carried out in conventional manner with cement slurry directed upward by the exclusive Baker "Whirling" action. Only readily drillable materials are used for all internal parts.—Look in your BAKER (or Composite) CATALOG, or write to BAKER OIL TOOLS, INC., at Houston, Los Angeles, or New York for complete information.

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Half-Century Mark

AS 1950 nears there are those who are attempting to evaluate men and events as to their proper place in what has happened over the past half century.

Had it appeared particularly important we were prepared to enter this historical contest with support for the contention that a top award should go to the business of oil with comparable recognition to several of its leaders.

Certainly no industry has touched more people at more points than has petroleum since the turn of the century. It has been closely associated with all the major world events which have determined the course of human affairs both in peace and war. Over-all there has been consistent progress—most outstanding in the case of those peoples who have made the widest and most intensive utilization of petroleum.

The early part of the 50-year period witnessed a shift in which petroleum's principal function changed from one of supplying light to the production of fuels for internal-combustion engines. Its replacement of other fuels in heating has also greatly increased. Better than 97 per cent of the oil produced in this country since the Drake well has been brought to the surface in this century. The phenomenal growth has been the despair of the prognosticators.

The half century was half over when many analysts of trends thought they saw a leveling off in oil demands. A competent group from the industry, in the A.P.I. report of 1925, predicted a maximum demand for gasoline in this country in 1950 of 455 million barrels. The domestic consumption in the year now ending will be more than twice that amount and there will be further increases in 1950. Predictors of permanent shortages in supply have had a similar fate.

Other significant figures for the half century could be presented. Russia in 1900 was a more important oil country than the United States, its output that year totaling 76 million barrels compared to 64 million barrels here. The petroleum possibilities of the two countries were comparable then and still are. But since 1900 our output has increased thirtyfold while their gains have been threefold.

We have not heard the fact that production has increased 10 times faster in this country than in Russia cited by her leaders nor explained by her defenders elsewhere. The half century has demonstrated many times that oil is where you find it, but its development and utilization are dependent on a way of life and the workings of a free economy.

So much for the past. Oil men are always more interested in tomorrow than in yesterday. Their accomplishments reflect that fact. But at this halfway point operators have the satisfaction of knowing that never was their position more secure than now and at no time was their outlook brighter.

THIS WEEK

BRITISH BAN—Restrictions on imports of oil from dollar sources imposed simultaneously by several British Empire units may lose many foreign markets for U. S. operators abroad. . . . State Department has entered protests. . . . Observers see possibility of gigantic world-wide struggle between dollar oil and sterling oil resulting in surpluses and price cuts. . . .

LEGISLATION—Congress returns next week for a politics-ridden session in which oil may be a football. . . . The industry's taxes and depletion allowance may be targets. . . . Old subjects of monopoly, tidelands, natural-gas regulation will be up again. . . . The investigating mood is rife. . . . ¶Texas Legislature will soon be in special session for a revenue hunt. . . . With oil the most likely quarry. . . .

TECHNOLOGY—"Slim" slim holes may become a new wildcatting tool. . . . Adaptation to oil drilling of small-diameter diamond coring used by mining industry studied as means of cutting exploration costs. . . . ¶New technique of "Micrologging" is getting wide use in West Texas. . . . Close measurement of pay zone thicknesses gives quick estimate of a lease's potentialities. . . . Useful in getting development loans. . . . ¶New diesel rail car dramatizes plight of refiners as distillates displace residual fuel oil. . . .

OPERATIONS—Large Texas Panhandle repressuring operation planned for Watkins field following success of nearby West Pampa project. . . . ¶Completion of first sulfur-recovery plant in the East points up trend toward producing merchantable element from sour crudes and gases. . . . ¶Texas drilling contractors may have to pay higher rates for workmen's compensation next year. . . .

TRENDS—Daily average refinery production of gasoline in the 4-week period ended December 17 was greater than in any summer month except July. . . . Peak production for 1948 came in December. . . . Refining trends toward increased runs during winter months to cover fuel demands boost gasoline production. . . . Higher gasoline inventories, projected for the end of the first quarter, indicate a need for additional light-products storage. . . .

ACTIVITY—Crude production for week ended December 24 averaged 4,941,785 bbl. daily, a decrease of 9,965 bbl. daily from previous week. . . . ¶Total well completions decreased to 871 for week ended December 24 after setting a record the week before. . . . ¶Number of rotary rigs operating in United States and Canada on December 19 dropped slightly to 2,252 but was still 164 rigs more than the weekly average this year. . . . ¶Major product stocks dropped 13,870,000 bbl. in 3-week period ended December 17. . . .

INTERNATIONAL—Venezuela's discovery record is good despite fewer rigs wildcatting. . . . ¶Series of boundary disputes among states of the Arabian Peninsula may result from attempts to obtain oil concessions on the trackless desert. . . . ¶Lack of success fails to dampen French wildcatting activity. . . . ¶Chile's oil field will start commercial production soon. . . . ¶Argentina plans natural gasoline and L.P.G. plant midway on its Rivadavia gas line. . . . New unit of La Plata refinery nearly completed.

NATURAL GAS—Huge gains in natural-gas sales shown in A.G.A. year-end review. . . . ¶Northern Natural arranges to tap new Hugoton reserves. . . . ¶I.N.G.A.A. seeks to intervene in Delhi case which may set FPC policy on regulation of independent producers. . . .

TWENTY MILES APART ON THE SAME REEF—The incredible size of Scurry County's Pennsylvania reef oil deposits is currently the talk of oil men everywhere. Proven oil reserves may check up to a total of 1 billion barrels. On "top" of the reef the oil-saturated section gets as thick as 750 ft. The six fields now producing from it—North Snyder, Wilkirson, Kelly, Schattel, Diamond-M, and Sharon Ridge (Canyon)—are expected eventually to connect into one mammoth oil reservoir. The reef's trend is northeast-southwest, and its length still is not established. These two pictures, taken by The Oil and Gas Journal last week, show drilling at what is now the extreme ends of the trend—separated by a crow-flight distance of more than 20 miles. On the right is the most northeasterly rig, The Texas Co. 1 P. L. Fuller. On the left is the most southwesterly rig, on the Henry Ford II-Doswell operation. Incidentally, Texaco's P. L. Fuller lease immediately northeast of the present North Snyder pool, was written for a reported bonus of $1,000,000. It is a big ranch, covering 30,000 acres in the one block. Texaco, in addition, has a lease on another Fuller ranch of 20,000 acres in the extreme western part of Scurry County

Britain's Imports Ban

Squeeze on U. S. companies may necessitate curtailment of foreign output, efforts to sell more in this country

Dahl M. Duff

NEW YORK.—The British Government has dealt a severe blow to American oil companies operating abroad, a blow which may have ramifications throughout the world.

It has prohibited imports into the United Kingdom, after January 1, of any fuel oil which must be paid for in dollars. Imports of motor fuel from dollar sources are reduced one-third.

Somewhat similar action has been taken by the governments of India and of Kenya Colony in East Africa and is under consideration in Australia. This culminates a series of British actions which have had the effect of excluding American-produced oil from various markets of the world. And there are rumors of further moves to favor sterling oil over dollar oil.

The announced purpose is to conserve dollar exchange in the British Empire and to provide outlets for surplus petroleum products produced by British-owned companies.

But some American companies view it as another step in a process of building up the British oil industry at the expense of the American, which eventually might squeeze dollar oil out of virtually all markets of the Eastern Hemisphere. They have made strong protests, and the U. S. State Department has entered the controversy (see accompanying Washington dispatch).

It is understood that British companies now have a surplus of about 75,000 bbl. per day which they can ship to England, and that imports by American companies will be curtailed by this amount. This is about half of the total shipments of petroleum products into England by American companies. Expansion of refinery capacity of British companies in the Caribbean and Middle East regions may increase this surplus during the coming year.

Possible results.—Possible long-range results of this British action may be:

1. Curtailment of foreign production by American companies, which could have serious effects on the economies of producing companies and might endanger the concessions.

2. A surplus of American-owned foreign oil which would seek a market in the United States.

3. A world-wide price war between dollar and sterling oil.

Discrimination?—American companies marketing in Great Britain consider the latest action unfair and discriminatory. They have offered to assist in meeting England's dollar-exchange problems, but their proposals have been ignored.

For some time British regulations have prohibited American companies from accepting sterling payment for oil sold in the sterling area and have required them to secure dollar exchange from the British Treasury in advance of the sale. American companies offered to take sterling, which would have permitted them to retain a share of the market without causing a drain on the British dollar exchange.

The companies offered to place themselves under British financial control, taking sterling in their trading operations and using this currency as far as possible for their own purchases in Europe. As for dollar profits and necessary purchases in the United States, the plan was that the companies would take no more dollars out of England than now required by British-owned companies.

The operations of the British companies, principally Shell in Venezuela, and Anglo-Iranian Oil Co., Ltd., in the Middle East, require a large dollar outlay for equipment and services not obtainable elsewhere than in the United States, and for royalties and other payments in the producing countries.

One American company was ready to completely "sterlingize" itself, moving the bulk of its offices to England and supplying itself in that country.

Company views.—The American companies principally affected are Arabian American Oil Co. and Bahrein Petroleum Co., Ltd., in the Persian Gulf; Standard-Vacuum Oil Co. and California-Texas Oil Co., Ltd., with wide Eastern Hemisphere marketing operations; Caltex and the Standard Oil Co. (N.J.) affiliate in the United Kingdom; and the American companies in Venezuela.

In view of the fact that the American companies have not been allowed to deal in sterling, the British Government action was generally denounced as being most unfair.

"This is a matter of survival," said one official of a company with major foreign operations. "We've tried to work with the British for a number of years back. They've stalled and stalled on the proposals we made and now they've virtually lowered the boom on us.

"All we want is the same deal as the British companies have with the British Treasury. We want to deal in sterling and convert no more dollars than the British companies are now permitted to take."

This statement and others illustrate the intensity of feeling which has arisen against the British over the issue. It is regarded as more serious than the British-Argentine bilateral trade agreement of last summer which virtually excluded American oil from that market and raised a similar storm of protest.

The prospective restrictions against American oil in the United Kingdom and elsewhere in the sterling area again brought talk of the possibility of a "price war" in world markets. Walter J. Levy, former oil director of the Economic Cooperation Administration, said the pressure of "unmanageable surpluses" in the hands of American companies "cannot but depress foreign oil prices sooner or later." Levy pointed out such a development would reduce Britain's own foreign-exchange income from its own oil companies.

Besides this, there was discussion of counteraction by the ECA which has supplied funds for the dollar cost of British oil expansion. Curtailment of these funds would hamper the program planned by the British.

Another implication was the possibility that the American foreign production barred from normal outlets in the Eastern Hemisphere, may react in higher imports into the United States. An extra 25,000 to 30,000 bbl. daily of Caribbean fuel oil would be available for East Coast or other markets because of the closing of the United Kingdom market.

Other countries.—Simultaneously with the British action, the Government of India informed American companies that they will be shut out of the Indian fuel-oil market after January 1. The government said it had been informed that sterling oil is now available.

The Indian Government notice specified the restriction as against "American-controlled oil," at the same time classifying oil purchased by an American company from the British refinery at Abadan as sterling production and thus suitable for import.

The British Colony of Kenya, in East Africa, likewise placed a ban on the imports of furnace oil from dollar sources, and, according to reports, this ban applies to any oil imported by an American company, regardless of its source. This gave support to charges by company officials in this country that the order was not de-

signed to save dollar exchange, as claimed, but to further the fortunes of British oil companies.

There were unofficial reports that Australian authorities were preparing to restrict imports of dollar gasoline into that country on grounds that ample motor fuel is now available from sterling sources. The Australian Government elected earlier this month promised to relax restrictions against motor-fuel use in the country.

Another device being used by the British in what begins to look like an "oil war" is the bilateral trade agreement. Last year an oil-for-meat deal was concluded with Argentina under which British petroleum supplies all Argentine import needs to the exclusion of dollar oil. More recently a barter arrangement was made with Sweden which effectively excludes American oil from that country.

Such restrictions on American oil companies, together with British plans to expand her refining industry with or without ECA financial assistance, have been the subject of a series of discussions between officials of the two governments. These discussions were resumed this week in Washington, and company representatives were hopeful that some easing of the restrictions might result.

British statement.—The official announcement of the British Ministry of Fuel and Power was as follows:

"There is now under discussion between the governments of the United States and the United Kingdom the problem of dollar drain on Britain and the rest of the sterling area from oil transactions.

"The dollar drain on the oil account is larger than for any other item. For the year 1950 it has been estimated on the basis of current prices that net dollar outgo would amount to $625,000,000, of which $350,000,000 would have risen from the operations of American oil companies in Britain and the rest of the sterling area, and $275,000,000 from world-wide operations of the British oil companies.

"The former estimate relates to oil which American companies sell in the sterling area, currently about 13,000,000 tons annually (approximately 260,000 bbl. per day). The latter, which has already been substantially reduced, is the dollar element in the cost of producing and distributing about 80,000,000 tons (1,600,000 bbl. per day) of oil of which more than half is marketed outside the sterling area for much-needed foreign currency.

"As a result of increased production, maintenance, and of restrictions of consumption, British oil companies expect to have available in 1950 some surplus oil over and above what they will need to supply their established markets. In view of the dollar deficiency in the sterling area, the British Government feels obliged to adopt a policy requiring oil imported to absorb the above-mentioned surpluses before drawing supplies from dollar sources. By this means, we expect to achieve a savings of 5 to 10 per cent of the above net dollar outgoings of oil in 1950.

"The British Government is, however, prepared to consider any proposal which may be put forward in order to minimize any immediate practical difficulty to United States oil companies which implementation of this policy may create, and have initiated discussions to that end with the companies concerned.

"The manner in which the longer terms of the above-mentioned surpluses can be best utilized without undue hardship to foreign investments and operations of American companies, is one of the subjects under discussion in current United States and United Kingdom oil talks. Measures under discussion to reduce dollar drain on oil accounts include adjustments in operating costs and procedures of various companies to minimize dollar outlay. In view of the above, it will be clear that there is still considerable dollar element in oil and the importance of economy in its use remains unaltered."

Washington Protests

U. S. officials take grave view of effects of British import restrictions as diplomatic talks resume

Bertam F. Linz

WASHINGTON.—Announcement by Britain that import permits for all of the dollar fuel oil and one-third of the dollar gasoline imported into England by American oil companies would be withheld beginning January 1 brought strong protests from United States officials as the Anglo-American oil talks resumed here last week.

It was generally conceded, however, that unless the British can be persuaded to modify the order, possibly by imposing the cuts gradually, which appeared unlikely, there seems to be nothing the United States can do but leave it up to the companies to decide whether they will substitute sterling for dollar products or discontinue importations into England which, for a time at least, would leave that country in a serious position.

The official explanation of the British order was that it was necessary to reduce the drain that oil imports constitute on British dollar reserves. It was estimated that a saving of from $31,000,000 to $62,000,000 would ensue.

In Washington, however, it was pointed out that the British company at Abadan has a surplus of fuel oil estimated at between 3 and 5 million barrels, to which it is adding at a rate of anywhere up to 100,000 bbl. daily, for which it has heretofore been unable to find a market. The British companies also are said to have a surplus of gasoline, which they will be able to liquidate under the cut of one-third in allowable dollar imports.

The short time between announcement of the order and its effective date, a bare 2 weeks, caught the American companies unprepared, it was said, and undoubtedly large volumes of products now in transit will have to be diverted.

Authoritative sources in Washington explained that under the order, instead of importing products made from crude oil in which they have a production interest, the American companies will have to buy British oil as jobbers, meaning that they will have to operate at sharply reduced profit levels or even at a loss, depending on the prices at which they can procure supplies from the British companies.

Reports from England represented the British Government as insisting that the surplus from the sterling area must be absorbed before dollars can be spent for oil. But it was said also that the British will consider any proposals developed in the talks now going on in Washington, and it was asserted there is no intention to interfere with the distribution arrangements of the American companies or to reduce their share of the market.

In Washington, however, it was pointed out that British companies plan to expand their production, and fears were expressed that as products became available the ban on dollar oil would be extended to other sterling areas, effectively knocking the American companies out of those markets.

Neither the British order nor its extension would be in line with the underlying objective of the Anglo-American talks to develop means whereby the dollar drain on the British could be reduced without endangering the legitimate interests of American companies in international trade.

Political effects.—Of major concern to Washington, too, is the possible political effects of the British action. The closing of sterling markets may necessitate a cutback of production in American-owned concessions in the Middle East and Venezuela if the pattern laid down for the United Kingdom is extended through other British-dominated areas.

This would not please either Ibn Saud or the Venezuelan Government, and the latter might have some dif-

ficulty in understanding why such of its oil as was produced by American companies should be barred as dollar oil while other oil produced by British interests should be accepted as sterling oil. Venezuelan oil, it was said, will be most heavily affected by the order.

Political repercussions may also develop here when Congress takes up the question of Marshall-plan appropriations for the coming fiscal year.

Government officials also are studying the order to determine whether it violates the antidiscrimination provisions of the Anglo-American loan agreement or the current reciprocal trade agreement. Russell B. Brown, general counsel of the Independent Petroleum Association of America, charged that it violated the latter and declared that the oil which cannot be sold in Britain now will seek a market here and be added to the current heavy imports.

The National Petroleum Council, as well as government agencies, is studying the situation. Chairman Walter S. Hallanan has instructed Frank M. Porter, president of the Mid-Continent Oil and Gas Association, to consider Britain's move in connection with the study of the petroleum import situation now being made by a council committee of which he is chairman.

"In view of the discriminatory action recently announced by the British Government restricting the participation of American oil companies in the markets of the United Kingdom, and canceling quotas on certain oil products heretofore supplied by American companies, I am of the opinion that the National Petroleum Council's committee on petroleum imports, under the assignment received from the Secretary of the Interior in June of this year, should give consideration to the serious effects of this summary action on the 'domestic industry, the domestic economy, and national security,'" Hallanan told Porter.

Hallanan also urged that, in view of the pressing nature of the problem, Porter's committee have a report ready for submission to the council at its meeting next month.

1950 NPC Studies

WASHINGTON.—Next meeting of the National Petroleum Council is expected to be January 26, but the actual date awaits completion of the 1950 council roster by Secretary of the Interior Oscar L. Chapman.

The NPC goes into the new year with only studies of liquefied petroleum gases, imports, and industry manpower hanging over from 1949, but at its next meeting may possibly be asked to take up three additional considerations.

A request for statistics on the effect of expansion of natural-gas consumption on fuel oil has been under consideration by the Department of the Interior for some weeks.

The Munitions Board is still concerned over last year's question of possible substitutes for quebracho in drilling mud, and may ask reactivation of the NPC committee. The wood from which the extract is prepared is a natural monopoly of South America, much of the supply coming from Argentina, and might be cut off in the event of war.

Another possible subject, of interest to the Navy Department, is tanker transportation. This question might include deepening of some of the Gulf ports to accommodate larger tankers as well as a general survey of tanker availability.

Lease Ban Lifted

Limited leasing of acquired federal lands to be allowed

WASHINGTON. — The Interior Department last week partially lifted the "freeze" order on the issuance of leases for oil and gas development on the acquired lands.

Leasing of the acquired lands—those secured by the government by purchase, condemnation or otherwise for national forest, military or other specific purposes—was suspended last summer when the House Public Lands Committee was considering bills to require public bidding for leases in which a competitive interest was shown.

In announcing that leases will again be issued, the department limited them to three categories, as follows:

1. When the applicant desires to drill upon the land involved in the lease applied for and will agree to commence actual drilling operations within 6 months of the date of issuance of the lease.

2. When the record discloses that the land is committed to an approved unit plan or that the land is within an area designated by the Geological Survey as logically subject to unitization in which event the lease will be issued conditioned upon a commitment to an approved unit agreement within 6 months.

3. When the lands applied for are demonstrated to be on the same structure or would be an integral part of a compact drilling unit on which the applicant will agree to commence drilling operations within 6 months of the date of issuance of the lease or leases. Applicants will be required to substantiate the structural situation of the land involved in relation to the proposed well.

Upon failure to comply with the 6-month drilling requirement in categories 1 and 3 the lease will be considered in default and subject to cancellation unless the period for the commencement of drilling is extended by the secretary.

The ban on leases not meeting these requirements will be continued until March 31, when the order will be reviewed in the light of the situation at that time.

The great majority of pending oil and gas lease applications are from Mississippi and Louisiana. The avowed purpose of the legislation was to secure more money for the counties in which the acquired lands are located, which share in the revenues from operations.

CONDITIONED AIR.—Fouling of the surfaces of moving parts of compression machinery is prevented to a large degree by cleaning the air which enters the compressor house in this Gulf Oil Corp. installation at Eunice, N. M. Air conditioners filter the fine, abrasive New Mexico sand from the air during dust storms and keep it from entering lubricating oil on exposed surfaces, reducing consequent wear of these parts. Breathing of the workmen is eased, and the housekeeping problem in the compressor house is reduced

Congressional Forecast

Short, bitter session to find oil industry in role of campaign bait; petroleum investigations being readied

Bertram F. Linz

WASHINGTON.—Congress will return to Washington next week for a relatively short (probably 7 months) but politically bitter session in which the oil industry appears scheduled to act the part of campaign bait.

The tipoff will come as the session opens, when President Truman sends his message on the State of the Union to the Capitol, but over the past few years a number of oil issues have gradually developed which are now ready to explode, just in time for the 1950 congressional campaigns, which are expected to show which way the political wind will blow in the presidential election 2 years later.

Because what is done or not done at this session of Congress will make the campaign issues out of which the President hopes for the election of a still stronger administration majority in Congress, he will turn on all the heat he can possibly engender, demand a maximum in the way of legislation, and take advantage of every opportunity to damn politically those who oppose his program.

Politics.—How much of the Fair Deal program will get through Congress will depend to large extent on whether the Republicans and Dixiecrats believe they can make more political hay by their support or opposition. In short, about everything brought up in Congress outside the normal routine will be looked at from the political angle.

In line with that philosophy, the President is quite likely to recommend that Congress ease off on some of the wartime excise taxes while calling for increases in corporation levies, pointing out that industry has made tremendous profits and possibly using as the horrible example the increase in steel prices announced following recent wage negotiations by companies which have been enjoying record profits—in dollar figures if not in buying power.

The President also is quite likely to issue another call for his economic expansion program, which he has already offered twice, first as a guard against inflation and then as a remedy for a possible depression.

He is expected to ask again for all of the measures he has sought in the past—fair employment practices, expanded social security and so on. But since the coming session is a continuance of the Eighty-first Congress which convened this year, it will not be necessary for him to offer these as new proposals and, in fact, a great deal of his program already is in the legislative mill.

A number of oil investigations are ready to go, and oil as well as civil rights will be a major subject of controversy during the next 6 or 7 months. At least two matters before Congress already have become "public" issues—tidelands and natural gas.

Tidelands.—In the case of the tidelands, proponents of state ownership are still confident that they could pass their legislation, while the administration forces are equally confident they could support the presidential veto it would get. On the other hand, administration leaders are not sure they could pass—and the opposition is such it could block—the legislation of federal administration necessary to secure operation of the tidelands in which the Supreme Court has held (in the case of California) or may hold (in Texas and Louisiana) the federal Government has paramount rights. Efforts to compromise the situation, mostly in favor of the Government, proved unsuccessful last session but new efforts to reach an agreement will be made in 1950.

Gas.—In the case of natural gas, legislation to divest the Federal Power Commission of control over independent producers and gatherers was passed by the House but was tied up in the Senate last session when former FPC Commissioner Leland S. Olds headed an all-out fight against it. Olds' nomination for another term on the commission later was rejected, and the position of his successor, Mon Wallgren, has not yet been officially disclosed.

Investigations.—Several investigations have been proposed for the coming session or are already under way, the most important, probably being the petroleum policy study planned by Rep. Oren D. Harris of Arkansas, chairman of the oil subcommittee of the House Interstate Commerce Committee, as a prelude to establishment of a national petroleum policy.

The same committee also has before it a proposal for another inquiry into the unsuccessful negotiations last summer by Mexico for a loan for oil development, sponsored by Rep. Charles A. Wolverton of New Jersey, and plans further, to study proposals for creation of a commercial synthetic liquid fuels industry.

Monopoly and prices will be the subjects of investigation on both sides of the Capitol. The House judiciary committee is already engaged in an inquiry into the adequacy of the anti-

CHEMICAL MOWER.—Pipe-line rights-of-way may be kept clear of brush, weeds, and tall grasses by new herbicide sprays developed by Dow Chemical Co. and successfully tested last summer along highway, railroad, and utility rights-of-way by applicators such as this. Three separate chemicals proved effective in killing weeds, grass, or brush as desired. Selected mixtures can control all three at once or maintain a growth sufficient to prevent erosion but not heavy enough to constitute a fire hazard or prevent access, according to the company

trust laws, and the Senate has before it a House-approved bill to amend the Clayton Act to make illegal the acquisition by one corporation of the physical assets of another when such acquisition would tend to lessen competition and create a monopoly. A further study of gasoline and fuel-oil prices probably will be made by the Senate banking committee, and oil will figure in an investigation of lobbying now being worked up by a special House committee.

Although no legislation may result immediately, taxes will come in for considerable discussion with the House ways and means committee and Senate finance committee planning to study the general question of depletion allowances, including the 27½ per cent allowed petroleum producers. Other subjects to come before these committees may include the tax exemptions now enjoyed by cooperative associations and tax relief for small business. The joint congressional economic committee will continue its study of a related subject, the stimulation of investment of private risk capital.

Plans of the congressional committee also call for a general study of natural resources by the Senate interior committee, and hearings by the Senate commerce committee on national transportation policy which will cover pipe lines as well as trucks, railroads, and other forms of transportation.

Indications are there will be more discussion than legislation in the field of oil. The top subjects of legislative effort by the oil industry, in addition to tidelands and natural gas, will be imports, on which hearings already have been held by a House small business subcommittee headed by Rep. Eugene J. Keogh of New York.

Legislation.—An effort may be made to secure legislation to require the Navy to return 57 Maritime Commission tankers it is now operating, which has been under study by the Senate commerce committee and, of course, there are the divorcement bills sponsored by Senator Guy M. Gillette of Iowa.

In the field of general legislation which will affect the oil industry among others there are the O'Mahoney bill to permit sellers to quote delivered prices and absorb transportation charges, and the bill, already passed by the House, for revision of the Social Security Act and extension of its coverage. The O'Mahoney bill is scheduled for a final vote in the Senate January 20 under an agreement reached when the House-approved conference report was brought up in the last days of the 1949 session and action was deferred so that adjournment would not be delayed.

WATCHING WASHINGTON

Bertram F. Linz

Optimistic on Oil

The National Security Resources Board has prepared another report on petroleum, in which it is understood to have told the Defense Department that the situation today, from the standpoint of military requirements, is far more optimistic than it was a year ago.

The report summarizes the conclusions reached by board oil experts after a thorough appraisal of all potential requirements for petroleum and products in the event of an emergency and the availabilities of such products.

The extensive development in this country since the war and the opening up of the great new Canadian fields are said to be the basis of the board's belief that the current situation is encouraging. In the event of an emergency, it has been pointed out, the Canadian oil can be made available to this country without the hazards of overseas transportation.

The board's conclusions are closely guarded, but in another report to the Defense Department, on manpower, it is known to have warned the military that they cannot have as much manpower as their original planning called for without cutting into the productive capacity necessary for support of military operations.

The study of petroleum was one of a series of surveys into the current position of various fuels, others dealing with coal, natural gas, and electric power. The coal study is said to be particularly important in view of the fact that markets for solid fuel are shrinking, while those for oil and natural gas are rapidly expanding. Projected into the future, this might mean that a time will come when coal production will be at a low level and difficult to expand rapidly in the event of war, while oil and gas consumption will be at high levels difficult to cut back.

Figuring for '50

It's just history, but it's interesting to see where we've been because it sometimes gives a hint of where we are going.

The year now closing was one of mixed trends. More automobiles and houses were sold than in 1948, less clothing and producers' plant and equipment. Inventories, which caught up with postwar requirements in 1948, declined moderately, resulting in a slightly lower volume of industrial production and employment, but personal income held to the 1948 level of 212 billion dollars.

The national income dropped 4 billion dollars under 1948 to 222 billion, but this is attributed entirely to price declines. Total wages and salaries were higher, increased wages more than offsetting a small reduction in employment. But earnings of corporations generally were under the 1948 record. With near-record crops, only government price supports limited the drop in farmers' incomes. There is something to think about in the fact that industrial unemployment averaged about 3,500,000 this year, compared with only 2,000,000 in 1948, and that for the first time since the war business discontinuances exceeded business births.

Adding it all up, government experts see nothing to be alarmed about in the outlook for 1950, but there are soft spots in the economy which may lead President Truman, in his message to Congress next week, to ask for legislation to allow the Government to step in if industry should show signs of sagging.

Two big problems which may develop are how to absorb the steady flow of new workers into the labor market—around 600,000 a year—in the face of increased productivity per worker, and how to achieve the new balance necessary because of contracting exports as Western Europe gets on its feet and Communism blacks out a large part of the world in which we used to trade.

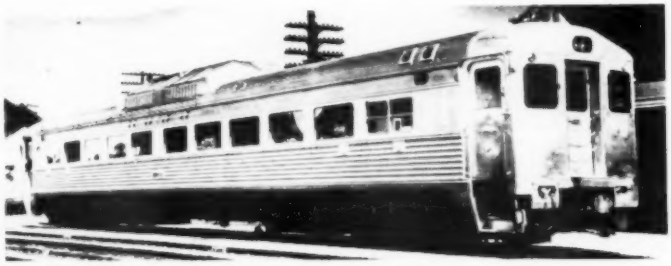
Drought Note

New York City is short of water and 20,000 people 2,000 miles away in Aruba may have to go native as a result.

One of the little-known facts of life is that the refinery population of Aruba has been supplied with water for nearly a generation from a reservoir in northern New Jersey, currently at the rate of about 200,000 gal. a day brought in by tanker.

New York's water shortage spills over into the adjacent New Jersey area and H_2O has become just about as precious as real prewar tiger's milk. As a result, Standard Oil Co. (N.J.) which runs the Aruba refinery, has cut its takings of water by 20 per cent in a voluntary effort to keep the kids from going 2 days a week with unwashed faces instead of 1.

WEST COAST



Side view of the self-propelled RDC-1

Diesel Trend

New equipment points up problem of residual surplus

Robert Harwick

OAKLAND.—The successful demonstration run of the newest in rail equipment has again pointed up the growing problem of West Coast refiners.

On December 19 the RDC-1 (rail diesel car), an ultra-modern, self-propelled rail car, carried railroad officials on a round trip from Oakland to Tracy.

The RDC-1 was designed primarily for suburban commuting, but has shown equivalent economies on runs of several hundred miles.

Built by the Budd Co., Philadelphia, the car is powered by two 225-hp. diesel engines, carries 250 gal. of No. 2 or No. 3 fuel, and averages 3 miles per gallon with a 59-ton load. Average operating cost with a 2-man crew is about 55 cents per mile.

The trend.—To the petroleum industry, and to California refiners in particular, the new car is just one more indication of the trend toward greater use of distillate fuels with no corresponding increase in use of residual fuels. In fact many uses of distillate fuels have been at the expense of residual fuels.

During the last 10 years over-all use of petroleum has increased about 75 per cent. In the same time diesel fuel use has expanded 245 per cent.

In California, residual fuels have been steadily going to storage. Just prior to the present winter season stocks were increasing at the rate of 50,000 bbl. per day. This condition has eased somewhat with production dropping from 900,000 to 870,000 bbl. per day, with residual shipments to the East Coast, and with a seasonal increase in use on the West Coast. But this is not an end of the trend. Merely a phase in the movement.

Refiners' view.—Diesel-engine manufacturers have pointed out that conversion to diesel at the expense of oil burning locomotives actually saves oil. This is true from the refiner's standpoint only when measured barrel for barrel. On this basis, 1 bbl. of distillate fuel will do the work of about 1.24 bbl. of residual fuel. Actually, in terms of California crude, the refiner must process 3.4 bbl. of 30 -gravity crude to make 1 bbl. of diesel fuel. With heavier crudes the picture is worse still; 6.7 bbl. of 14 - gravity crude is required to make 1 bbl. of diesel.

On the other hand, 2.5 bbl. of 30 - gravity crude will produce 1 bbl. of residual fuel and 1.25 bbl. of the 14 - gravity crude is needed to give a barrel of residual fuel. In terms of crude oil, far less production is needed to serve residual-burning engines.

But this is just a sidelight. The fact remains that diesel and distillate fuel use is growing three to one for residual. Pressure is definitely on the West Coast refiner. New markets must be found for residual oils, or new residual cracking facilities with necessary product processing plants must be built. The latter case also has a market problem in the large quantity of coke produced.

TECHNOLOGY

"Slim" Slim Holes

Core drilling of 1½ to 4-in. holes to 10,000 ft. talked

Kenneth B. Barnes

DALLAS.—"Slim" slim-hole drilling may soon be introduced to the oil industry as a new technique for reducing the cost of wildcatting unproven areas.

Plans are now actively under way to design equipment to run a diamond core drill to depths of as much as 10,000 ft., making hole from 1½ to 4 in. in diameter. The developers believe this might cut the cost of an exploratory well to one-third of the expense involved in present methods.

This is not what the oil industry already knows as "slim-hole drilling," but is an adaptation of techniques now used in the mining industry. If the current experiments solve problems of meeting conditions encountered in oil and gas-bearing formations, a new concept of slim-hole drilling might emerge and a new exploration tool be provided.

Progress.—Last month a dozen drilling experts from some of the country's major oil companies met here with representatives of an oil-field service company and a manufacturer of specialized equipment to discuss the possibilities of "slim slim holes." The group felt the cost of finding new oil reserves and of testing the results of geological and geophysical work might be greatly reduced by a more efficient method of obtaining core samples from deep formations.

In addition to wildcatting, other possible uses of extra-slim coring were considered. Continuous slim-hole coring could be used to determine a total geological section. The technique could economically evaluate leases due for cancellation or renewal. Slim-hole coring ahead of a large-hole bit could probe for hazardous drilling conditions and probable productive horizons. Finally, there is the possibility that a slim core hole could be completed as a producing well.

Results were not made public, but the discussion was deemed so satisfactory that experimental work was started immediately toward the design of equipment suitable for wildcat drilling.

Three weeks later the curtain was lifted a bit by Robert E. Todd of Core Laboratories, Inc., Dallas. Speaking at the Texas A. & M. College meeting of the American Institute of Mining and Metallurgical Engineers, he said:

"At the present time special equipment is being designed for the use in slim-hole diamond coring in wildcatting unproven areas.

"It is only a matter of time that slim-hole diamond coring equipment will be available to core to a depth of 10,000 ft. at a cost greatly reduced from the now expensive large holes. This equipment is being designed to take cores from grass roots to total depth.

"During the past few years the mining industry has sunk holes less than 3 in. in diameter to depths of 10,000 ft. with the use of diamond coring tools, but not until the past few weeks has there been a serious effort to combine the knowledge of these two industries in developing a more economical method of wildcatting.

Background.—The term "slim hole drilling" entered the oil industry about 10 years ago and has come to

have a standardized meaning wherein portable-type rotary rigs are used to drill wells in the range of about 3,000 to 6,000 ft. deep. While slim in comparison with the usual oil well, such holes are big enough to accommodate 4-in. casing.

The mining industry, however, is successfully using diamond drills to core hard formations to depths in excess of 6,500 ft., making hole as small as 1½ in. in diameter. This has been done for some years in Michigan and other United States mining areas, and in Africa diamond coring is now being done to depths of 10,000 ft. Another side to this slim-hole picture is the fact that the present portable-type rigs can be, and already have been many times, combined with the use of 2⅜-in. A.P.I. drill pipe, or the "PK" or "N" type core drill rods, for small-diameter drilling to substantial depths.

New Logging Method

Scurry County developers find new system gives accurate measurement of pay section, helps determine well potential

Kenneth B. Barnes

SNYDER, Tex.—One of the "hottest" engineering developments in the hot Scurry County, Texas, oil fields is the widespread use of a new electric logging system called "micrologging."

It measures each individual pay section of a new well down to a fraction of a foot. Operators are using it to determine the amount of "permeable pay" within the over-all total amount of potential production.

So much faith is put in the technique in this region that a number of independent operators — who are heavily represented here—are using it as a quick means of getting loans for development drilling.

Logs are run and taken to banks in Dallas, Houston, Tulsa, or others which specialize in oil loans. The bank's oil appraiser counts up the number of feet of permeable pay from the log, multiplies by 145 bbl. per acre foot (or other suitable factor), and the product is the calculated oil recovery. The loan is quickly made on that basis.

The new technique was developed by Schlumberger Well Surveying Corp. and is offered under the trade name "Microlog." It does not supplant other firmly established electrical logging systems, core analyses, radioactivity logging, sample examination, and the like. In fact, the self-potential curve of standard electric logs, the gamma ray curve of radioactivity logs, and caliper surveys of the well-bore diameter provide additional data for interpretation of the micrologs. What the new surveys do solely is to provide a more precise count of pay thickness.

This is how micrologging works:

Principle. — The electrical properties of very small volumes of formation near and behind the wall of the hole are measured. The electrodes are maintained against the wall of the hole by spring action. Precautions are taken to minimize the bypass effect of the mud so that the electrical measurements made, in the case of permeable formations, are of the mud cake and a part of the invaded zone lying close to the well bore.

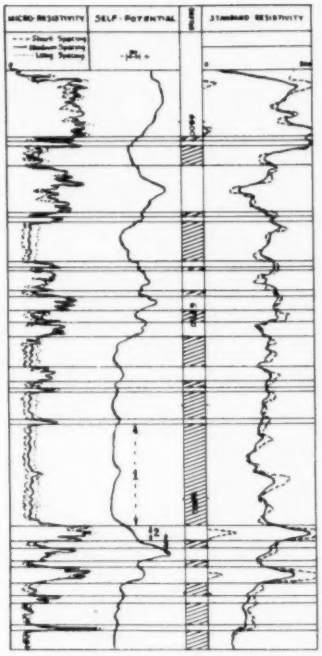
Electrode spacings. — These are very short, 1 to 2 in. Two or three are generally used simultaneously; the shorter the spacing, the greater the relative influence of the mud cake. Opposite permeable beds the spacings will give resistivity values which are generally low. Inasmuch as the resistivity of the invaded zone is usually greater than that of the mud cake, the value of the resistivity measured increases with the spacing.

If the measurement is made opposite an impervious and conductive formation, such as shale, all spacings should give approximately the same low value of resistivity. When the device passes by a hard formation, very high resistivities are recorded with all spacings.

Example. — The accompanying chart shows an example of a microlog, along with an electric log having the conventional self-potential and resistivity curves. There is a striking difference in the shapes of these logs. The microlog shows a sequence of flat zones and sharp peaks which delineate the permeable zones, whereas the S.P. and resistivity curves are rounded off and do not show sharp breaks between zones.

The microlog shown has been recorded with three different electrode spacings. In several zones, the three corresponding microlog curves show comparatively low resistivities, and are definitely separated from one another. The lower resistivity curve corresponds to the shortest spacing, the medium curve to the medium spacing, and the highest curve to the largest spacing. This feature is characteristic of permeable formations.

The boundaries of these different permeable and nonpermeable zones are exactly marked by sharp breaks in the microlog curves. Reference lines have been traced on the illustrative chart at the boundaries of each of the permeable zones.



Comparison of micro and standard logs

Interpretation.—On the chart, certain beds are designated as zones 1, 2, and 3. The regular resistivity curve shows a peak in front of No. 2, which is an indication of a hard, impervious formation; but it is not possible to conclude whether the zones above and below No. 2 are impervious or permeable. The regular S. P. log shows a deflection to the left in front of No. 1 which is likely to correspond to a permeable zone, but there is only a slight deflection in the slope of the S. P. curve between zones 2 and 3.

The interpretation of the conventional log is thus fairly easy for beds No. 1 and No. 2, but almost impossible for bed No. 3, and the boundaries between the beds are poorly indicated. However, the microlog shows that beds No. 1 and No. 3 are permeable ones, separated by the compact and dense zone No. 2. In all cases on the microlog, the locations of the boundaries of the zones are given with remarkable clarity.

Application.—This new system points up some of the interesting things that now can be done by electric logs. The micro surveys can give very precise pay-footage counts. Connate water can be calculated by Archie's method *(for recent review, see The Oil and Gas Journal, June 23, 1949, page 143)*. Porosity also can be calculated from electric log data *(same reference)*. And permeability relationships also can be determined. *(See Journal article, June 16, 1949, page 113.)*

Texas Tax Question

Oil industry fears general increase in natural-resource taxes; legislators to ponder state income drop in January

Leigh S. McCaslin, Jr.

HOUSTON.—The oil and gas industry paid 61.2 per cent of all business and property taxes collected in Texas during the 1948 fiscal year.

The significance of this fact is of particular importance to the oil industry at this time.

In late January or February the Texas legislature will meet in special session to straighten out the state's finances. Expenditures must be cut or more taxes levied to balance the budget. Estimates of the money needed, if expenses are not curtailed, range from $30,000,000 to $100,000,000. The need for money is the result of two things:

1. The legislature adjoured last July without providing funds for the coming year for eleemosynary institutions.

2. Reduced crude-oil output has lowered the state's income well below the expected figure.

Alternatives.—Several influential persons in state politics have suggested alternatives to increased taxation. State Rep. Vernon McDaniel recommended cutting five or six million dollars out of the departmental bill and go on deficit financing for $17,000,000. Then, he believes, the next regular session should study the whole tax structure and readjust it to meet current needs.

Rep. William A. Swindell has suggested selling state lands not being put to use and centralizing of all state hospitals and special schools in one spot for economy.

Railroad Commissioner Olin Culberson suggested at last month's proration hearing that lower expenditures might work better than more taxes in solving the state's dilemma.

More specifically, Reps. Sam Hanna, Louis Ivey, and James B. Pattison have suggested a 15 per cent blanket cut in major appropriations already made for the current fiscal year.

Two factors favor no new taxes: (1) A general state election is coming up in 1950—new taxes might influence the voters adversely. (2) Many new industries and businesses are attracted to the state because of its favorable tax structure. Since the oil and gas industry is bearing the brunt of the Texas tax burden, and has for some years, it appears probable that attempts will be made to increase this burden. In fact, Gov. Allan Shivers stated last August shortly after assuming the state's highest office that "... while natural resources are already producing a considerable portion of our revenue, they can stand some additional tax burden." He did qualify his remark by adding that "the time is rapidly approaching when these resources will have been fully exploited."

What to expect.—A look at the oil and gas tax bills introduced and not passed during the Fifty-first legislature may provide a clue as to possible tax measures in January. These included: production tax of 1 cent per 1,000 cu. ft. on natural gas; repeal of 4-cent-a-gallon retail gasoline tax and substitution of a 1-cent-a-gallon processing tax on all combustible fuels; 1½-cent per 1,000 cu. ft. levy on natural gas gathering; sliding-scale levy on oil production ranging from 1.5 per cent to 8 per cent of market value; gas-gathering tax based on a sliding scale according to the market value of the gas; and a blanket 10 per cent increase in the rates set up by the omnibus tax bill.

However, the measure that is believed to be favored by many state officials is a blanket increase in the rates prescribed by House Bill 8—the omnibus tax bill of 1941. Gov. Shivers implied his approval of this means of raising taxes before succeeding the late Beauford H. Jester. If this tax-raising method is used, it might mean as much as a 20 per cent increase in rates. Or, other items might be added to the bill. There has been speculation that natural resources not now taxed might be added.

Present taxes.—The omnibus tax bill levied a tax on a number of things, including: production of crude oil, natural gas, carbon black, and sulfur; gas utilities; corporation franchises; retail gasoline sales; cement distribution; oil-well cementing business; gross receipts of telephone companies and electric utilities; retail sale of motor vehicles; distilled spirits; liquor prescribed by a physician; radios; cosmetics; intangible tax; motor-bus companies; chain stores; and insurance company premiums.

The tax on crude oil is one of the two major sources of income from the bill. (Retail sale of gasoline is the other.) The tax rate is 4.125 per cent of value for crude oil. The crude-oil tax brought the state an income of $87,338,191 the past fiscal year. The natural gas tax is 5.2 per cent of value, and tax receipts were $8,862,970 for past fiscal year.

In addition to the gross production tax on crude and natural gas, operators pay franchise taxes, drilling permit fees, payroll taxes, regulatory taxes, 4 cents per gallon of gasoline used by company cars and trucks, and ad valorem taxes (not only to the state, but also to counties and school districts).

Oil-industry view.—Industry representatives are hoping to convince the legislators and the public that further taxation of the oil and gas business is unjustified. They feel the industry is, at the minimum, bearing its fair share of the cost of state government and that if further revenue is necessary it should come from other sources.

Many arguments are set forth as proof of this point: Texans pay no state income tax. . . . Texans pay no sales taxes. . . . Natural-resource taxes paid in Texas during 1946 were $6,300,000 greater than the total in natural resource taxes paid by all other states combined. . . . Oil and gas operators paid 45 per cent of the general fund revenues in 1947. . . . At least half of the state contribution for old-age pensions was paid by the industry in 1948. . . . One-third of the cost of public education in 1948 was borne by the industry.

An inconsistency in the state's tax program, which is pointed out by some, is that only five (crude oil, natural gas, sulfur, carbon black, and cement) of the state's many natural resources are taxed. Timber, salt, sand, gravel, gypsum, limestone, magnesium, clay, and fuller's earth are among the natural resources escaping taxation.

Watkins Project

Gas-injection plans for 1,302-well pool completed

Kenneth B. Barnes

PAMPA, Tex.—Success of the enormous gas-repressuring project covering the West Pampa pool (11,667 acres, 1,010 wells including 140 for input) which was started in March 1946, has led to a decision to start the same program in the big Watkins pool immediately to the northwest.

The Watkins repressuring will be even larger, as this pool covers 19,200 acres and has 1,302 wells.

The Watkins Operating Committee, just formed to initiate the new repressuring, will represent the 75 in-

Members of the executive committee of the Watkins Operating Committee, which will head the Watkins repressuring project in Carson and Hutchinson counties, Texas Panhandle, are shown above. Left to right: F. D. Baker, Kewanee Oil Co.; George Vandaveer, Jr., Mid-States Oil Corp., secretary-treasurer; G. J. McLernon of J. E. Crosbie, Inc.; Alex Clarke, Jr., Stanolind Oil & Gas Co., vice chairman; A. E. Herrmann of Herrmann Brothers; E. Don Harlan, The Texas Co.; and Dr. H. H. Kaveler, Phillips Petroleum Co., chairman. Final organization was completed in Amarillo on December 13, and headquarters for the repressuring project has been established in Pampa. Skelly Oil Co. is service agent for the gas-injection project which will include 1,032 wells

dividuals, independent operators, and major companies which own the leases. West Pampa and Watkins together will constitute the largest projects of their kind in the world. The two projects are in the center of the general northwest-southeast trend area of Panhandle field.

This second repressuring project was conceived shortly after first plans were laid for the West Pampa program. However, it was the consensus of operators concerned that the West Pampa project should first prove itself before another project was undertaken. Now, after almost 4 years, the field is producing 5,000 bbl. above what it might have produced had not secondary recovery methods been adopted.

Treaters, dehydrators, gas distribution systems, and meters, plus the cost of gas injection and operation, are to be paid by each oil operator on a prorated basis of monthly oil production from the entire project.

It is anticipated that the Watkins initial gas-injection rate will be 6,000,000 M.c.f. daily with an ultimate 20,000 M.c.f. foreseen. It is estimated 4 months will be needed to assemble materials for the expansion of the Skelly plants.

In most cases, old wells will be converted to input wells, with the possibility that some will be drilled for input purposes only. All wells will be thoroughly reconditioned. It has been estimated that repressuring will add 25 years of life to this already 25-year-old field.

Two other large gas repressuring projects in this area also recently have been favorably discussed and early work is anticipated. These are the Schafer Ranch and Stinnett pools.

Detailed articles on the West Pampa repressuring appeared in The Oil and Gas Journal, February 10, 1945, page 74, and November 9, 1946, page 66.)

Higher Rates

Texas drilling contractor insurance costs to rise

D. H. Stormont

DALLAS. — Texas drilling contractors during 1950 will be paying a little more for their workman's compensation insurance than they did during this year.

New rates have not been announced, but proposed "pure premium" rates indicate this will be the case.

The 1949 pure premium rate of $4.84 per $100 annual payroll was based on the accident-frequency experiences of the Texas drilling industry during 1945 and 1946. During 1947 benefits paid by the insurance companies were relatively higher than the increases in drilling payrolls so that next year's proposed pure premium was advanced to $4.87. The total premium may amount to about $8 per $100 annual payroll since about 40 per cent of the total premium goes for overhead, etc., of the insurance companies.

Benefits paid.—Statistics for these 2 years show that in 1947 the Texas drilling industry had an annual payroll of $66,457,700 as compared with $50,497,600 in 1946. Benefits paid as a result of serious injuries were $1,124,475 for 254 injuries in 1947, as compared with $888,736 for 193 in the previous year.

Nonserious injuries during these 2 years cost $1,398,468 (3,067 injuries) and $1,135,698 (2,736), respectively. Medical assistance paid as a result of these injuries was $669,578 in 1947 as compared with $473,101 in 1946.

Future rates.—While increased workman's compensation rates are in prospect for next year, those familiar with progress in the drilling industry's accident prevention program feel that 1951 rates probably will be lower. Contractors currently are paying for experiences realized in the early postwar period, when all existing equipment was at work making hole regardless of its efficiency and condition. Then, too, drilling crews were not as well trained as they now are.

In the past 12 or 18 months most drilling contractors have reduced the number of accidents on drilling rigs by some 33 or 50 per cent, even while making more footage. Thus when 1948 and 1949 figures are used as the basis for computing premiums, 2 or 3 years from now, Texas contractors should see the result of their safety programs in the form of lowered insurance rates.

EASTERN

Freedom-Valvoline Sold

FREEDOM, Pa.—Sale of Freedom-Valvoline Oil Co. to Ashland Oil & Refining Co. was announced last week by Earle M. Craig, president, and William G. Bechman, chairman of the board of Freedom-Valvoline.

Both Craig and Bechman indicated the sale was negotiated because of government inheritance and income taxes which, they said, would necessitate the dissolution of the company

in the event of the death of either major stockholder.

"Higher and higher inheritance taxes, as well as income taxes, have meant that business developed by an individual, or a small group of individuals, cannot be passed on to a second generation," a joint statement sent to employes of the company said.

Freedom-Valvoline is a major producer of Pennsylvania Grade crude oil, operates a complete, 4,000-bbl. refinery at Freedom, has a pipe-line system in the Ohio-Pennsylvania-West Virginia district, and has interest in blending plants abroad.

Sulfur-Recovery Plant

Gulf Coast company prepares to open first East Coast unit to recover elemental sulfur from refinery gases

George Weber

NEW YORK.—The first East Coast plant for recovering elemental sulfur from refinery gases will go on stream next month at Westville, N. J.

Freeport Sulphur Co., a major producer of that commodity on the Gulf Coast, is entering the growing group of sulfur and oil companies who are tapping a new source of the element in petroleum and natural gas.

With a capacity for producing 40 to 50 tons of elemental sulfur daily, Freeport's new plant is a minor factor in the company's over-all sulfur business. But it serves two purposes, both highly important to the oil industry.

Raw material for the new plant is acid gas, or hydrogen sulfide, from the adjacent Eagle Point refinery of The Texas Co. This new refinery will process 40,000 bbl. per day of high sulfur crudes from South America and the Middle East. Disposing of the sulfur compounds separated in the refining process ordinarily would pose a difficult disposal problem. Burning the sulfur gas, as is sometimes done in isolated locations, would cause air pollution in this industrial area.

So the sulfur plant substitutes for an expensive disposal project and at the same time turns a waste product into a saleable commodity.

How it works.—The new plant was constructed by Girdler Corp., which collaborated with Freeport engineers in design of the process and eqiupment. Construction began last summer, and the unit will be ready to operate as soon as the fluid catalytic cracking unit at the adjacent refinery is placed on stream.

Pure sulfur will be produced by the modified Claus process. One-third of the incoming hydrogen sulfide is burned to produce sulfur dioxide. The two sulfur compounds are then combined catalytically to form sulfur and water. Heat generated in the process will be utilized to produce steam to power blowers and pumps.

The Freeport plant is the fifth to operate in conjunction with oil and gas installations in this country, and second to process hydrogen sulfide from refinery gases. Since the first such recovery of elemental sulfur was realized near the close of World War II, six projects have been placed in operation or are under construction. They will total about 600 tons of sulfur daily in their combined capacities.

Others like it.—The first commercial plants in this country were built by Southern Acid & Sulphur Co. at McKamie and Magnolia, Ark. These plants took acid gas from adjacent natural-gasoline plants processing South Arkansas gas. Since purchase of Southern Acid by Mathieson Chemical Corp. last February, they have continued in operation under new ownership and are making about 100 tons of sulfur per day

Early this year, Stanolind Oil & Gas Co. began operating a similar conservation plant in Elk Basin field, Wyoming. Constructed by Stone & Webster Engineering Co. as part of an over-all natural-gasoline project, the Stanolind plant is designed to produce about 80 tons per day.

The first American plant to recover elemental sulfur from refinery gas was built by E. B. Badger & Sons Co. for Hancock Oil Co. at Los Angeles. *(See the Oil and Gas Journal, April 21, 1949, page 241).* Design of this 50-ton unit was the result of cooperative work by Hancock and Badger engineers. The plant processes gas from four nearby refineries: Hancock's 12,500-bbl. plant, the 80,000-bbl. Richfield Oil Co. refinery, the 62,000-bbl. Union Oil Co. of California refinery, and The Texas Co.'s 50,000-bbl. plant. The sulfur plant is now being enlarged to a capacity for producing 60 to 70 tons daily.

By far the largest sulfur-recovery project of its kind is now nearing completion in Worland field, Wyoming. Early next year Texas Gulf Sulphur Co. will commence operations on a giant plant which will be capable of recovering 300 long tons of elemental sulfur from Worland casing-head gas, which averages about 38 per cent hydrogen sulfide. In cooperation with Pure Oil Co., which is building a 20,000,000-cu. ft. gasoline plant, Texas Gulf worked out design of the new plant with the engineering aid of Foster Wheeler Corp. Contract for construction of the joint gasoline and sulfur project was let to C. F. Braun & Co.

Idea may spread.—While no additional sulfur-recovery plants are known to have been contracted elsewhere in this country, other areas where processing sour gas and crude oil is concentrated are known to be under serious consideration. These include sections of West Texas, New Mexico, the Gulf Coast, the Rocky Mountains, and California.

The probable increase in charges of sour crudes to stills in East Coast refineries also raises the prospects of additional sulfur-recovery projects in Eastern refining centers. East and West Coast installations can be justified economically on a smaller scale than elsewhere because of the proximity of ready sulfur markets which give a definite transportation advantage over central and Gulf Coast projects. Aside from plant costs, estimated at $5,000 to $7,000 per ton-day capacity, and operating costs which run about $6 per ton, transportation charges comprise an important factor, varying with geographical location. The price of sulfur has been stabilized at $16 per ton for many years.

Foreign operations. — Sulfur recovery from smelter and gas sources has been practiced for years in Europe. The first major unit in the petroleum field was built by a German company before the last war at Abadan, Iran. This 10-ton project, which takes gas from the adjacent 500,000-bbl. refinery of Anglo-Iranian Oil Co., Ltd., was expanded after the war by British interests to 50 tons per day.

Trinidad Leaseholds, Ltd., in partnership with Universal Oil Products Co., has organized Tricana Industrial Chemicals, Ltd., to manufacture chemicals from Trinidad petroleum. One phase of this new venture is a sulfur-recovery plant utilizing gas from the Trinidad Leaseholds refinery.

A plant for converting hydrogen sulfide occurring with Poza Rica gas is understood to be planned in Mexico. This proposed plant will utilize gas from a pressure-maintenance and gasoline-plant project which includes a Girbotol treating unit.

The prospects for additional foreign sulfur-recovery projects are many, attending the increase in refining capacity for predominantly sour foreign crudes. Gas processing in the future offers further concentrations of hydrogen sulfide for possible recovery. In addition to new concentrations of sour-crude refining in Venezuela and the Middle East, new European installations and the expanded Montreal East refining center in Canada offer probable petroleum sources for economic recovery of one of the most important of chemical raw materials.

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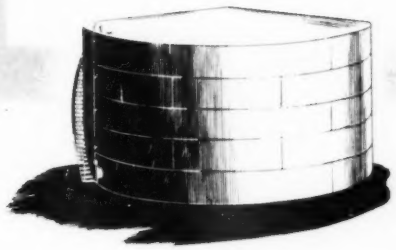

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Gas-Industry Review

Customers, sales, revenues reached new peaks during past year; further expansion expected to follow in 1950

NEW YORK.—Sales of natural gas by utility companies increased approximately 8 per cent in number of customers, 9 per cent in volume and 10 per cent in revenues during 1949 compared with 1948.

This is revealed in a year-end review of the gas business prepared by Hugh H. Cuthrell, president of the American Gas Association. Other highlights of the A.G.A. report:

Many new records were established by the gas industry in 1949. More than half a million new customers were added to the gas utility lines. Sales of gas to ultimate consumers reached a new high level. Revenues from the sale of gas were the highest on record. Capital expenditures for construction and plant expansion totaled nearly one billion dollars, breaking all previous records.

Tremendous extensions of natural-gas transmission lines are scheduled to bring natural gas into new areas in 1950. Lines now are under construction that will bring natural gas to metropolitan New York and New Jersey. It is almost certain that the New England States and the South Atlantic territory soon can augment their manufactured-gas supply with natural gas.

At the end of 1949 the gas utilities were serving an estimated 23,763,400 customers, including about 334,000 users of liquefied petroleum gas served directly by utilities. This was an increase of 2.5 per cent over the 23,183,000 actual customers served in 1949. Of the total number served, 13,319,000 were receiving natural gas, a gain of 8 per cent; 8,566,600 were receiving manufactured gas, a decline of 0.4 per cent; and 1,544,300 were served with mixed gas, a decrease of 20.1 per cent. The decline in manufactured and mixed-gas customers can be attributed to changeovers by important gas utilities from manufactured and mixed to natural-gas distribution.

In addition to the customers reported above it is estimated that more than 5,500,000 customers are being served with L.P.G. in territories not reached by gas utility mains.

Utility sales of natural gas during 1949 were about 3,153,335,000 M.c.f., an increase of 8.9 per cent over 2,894,650,000 M.c.f. sold in 1948. Manufactured gas sales amounted to 420,087,000 M.c.f., a decline of 5 per cent, while mixed gas sales decreased 8.5 per cent to total 135,577,000 M.c.f.

Total revenues from the sale of gas reached an all-time high of $1,694,331,000, an increase of 7.3 per cent over revenues of $1,579,603,000 in 1948. The major increase occurred in the natural-gas branch where revenues rose to $1,097,328,000, 10.3 per cent over 1948.

The gas industry continued its tremendous efforts to meet the ever-increasing demand for gas last year. Expenditures for gross construction of new facilities and expansion of present facilities in 1949 reached an all-time high of $943,000,000, exceeding last year's peak of $770,000,000. The industry recently resurveyed its capital requirements for the 5-year period from 1948 through 1952 and found that about 3½ billion dollars will be required. It is estimated that 1.8 billion dollars will be spent by gas companies in the next 3 years. Manufactured and mixed-gas companies expect to spend $500,000,000 during the 5-year period, with natural gas utilities spending 3 billion dollars. Of this amount about 1.8 billion dollars will go for new natural-gas transmission facilities.

In the 6 months ended June 30, 1949, the Federal Power Commission authorized construction of 4,900 additional miles of pipe line to cost about $374,820,000. Another 8,500 miles are now under construction and applications are pending before the FPC for about 14,600 miles.

Industrial and commercial utilization of gas continued to advance during 1949. While the increase in revenues from sales of all gas for the year was 7.3 per cent over 1948, industrial-gas revenues were up 8.3 per cent and commercial-gas revenues rose 7.9 per cent over 1948. The combined industrial and commercial revenues now account for 38 per cent of the total revenues of the industry.

UTILITY SALES OF NATURAL GAS

	1949 estimate	1948 actual	Per cent change
Customers:			
Total	13,319,000	12,327,800	+ 8.0
Residential	12,198,600	11,292,700	+ 8.0
Commercial	1,060,000	978,700	+ 8.3
Industrial	50,500	46,900	+ 7.7
Other	9,900	9,500	+ 4.2
Sales (M.c.f.):			
Total	3,153,335,000	2,894,650,000	+ 8.9
Residential	905,823,000	832,205,000	+ 8.8
Commercial	306,640,000	280,431,000	+ 9.3
Industrial	1,821,503,000	1,668,437,000	+ 9.2
Other	119,369,000	113,577,000	+ 5.1
Revenues:			
Total	$1,097,328,000	$994,841,000	+ 10.3
Residential	581,943,000	529,115,000	+ 10.0
Commercial	146,382,000	131,556,000	+ 11.3
Industrial	347,869,000	314,799,000	+ 10.5
Other	21,134,000	19,371,000	+ 9.1

Wyoming Price Cuts

Price reductions have been posted by Ohio Oil Co. for heavy crudes produced in the Byron and Garland and Oregon Basin areas in Wyoming.

Byron and Garland crudes have been reduced 15 cents in price, from $1.65 to $1.50 per barrel. Crude oil from Oregon Basin in now posted at $1.40 per barrel, a reduction of 25 cents from the former price of $1.65.

Byron crude has a gravity of 24° A.P.I. and a 1.8 per cent sulfur content, Garland crude is 22° A.P.I. gravity and contains 2.8 per cent sulfur, and Oregon Basin crudes are of 21 and 18° A.P.I. gravity and contain 3.2 and 3.7 per cent sulfur.

The price reduction should help increase demand for these heavy crudes which, except in modern cracking installations, produce from 60 to 65 per cent heavy fuel oil.

MID-CONTINENT

New Hugoton Outlet

HOOKER, Okla.—Plains Natural Gas Co., San Antonio, Tex., is preparing to begin immediate construction of a gathering system in Hugoton gas field to deliver gas to Northern Natural Gas Co. Initial delivery, expected to start by the end of January, is anticipated at the rate of 50,000,000 cu. ft. daily.

This is the result of a contract between the two companies for the sale of gas from 115,000 acres controlled by Plains Natural in Oklahoma and Kansas areas of Hugoton field. This company now has three drilling rigs engaged in the development of its properties.

Northern Natural is expected to build a lateral to connect with the new gathering system at a point in the Oklahoma Panhandle near the Kansas border.

Vernon F. Taylor, Jr., San Antonio, is president of Plains Natural, and Clyde Thompson, Hooker, is in charge of the company's field operations.

LATIN AMERICA

Better Wildcat Ratio

Venezuela records 24 successful completions out of 42 exploratory wells during first 10 months of 1949

Dahl Duff

EXPLORATORY drilling undertaken this year in Venezuela is showing a considerably higher ratio of successful completions than was the case in 1948.

For the first 10 months of this year, 42 exploratory wells were drilled in Venezuela. Of these, 24 were completed as producing wells, giving a ratio of 1.75 wells drilled to successful completions as producers.

For the entire year of 1948, 51 exploratory wells were drilled. This resulted in only 15 completions as producers and a ratio of 3.4.

Location.—Of the 42 wells through October of this year, 9 were in the Maracaibo area, 27 in Barcelona, 5 in Maturin, and 1 in Barinas. This compares with the following breakdown by districts for the 51 exploratory wells in 1948: 11 Maracaibo, 30 Barcelona, 8 Maturin, 1 Barinas, and 1 Apure.

Operating rigs.—Although exploratory drilling this year is continuing at about the same rate as 1948, the total number of rigs in operation is considerably lower. This indicates the operators are concentrating on their most likely prospects. The 12 rigs operated by Creole Petroleum Corp. on exploration in January had been cut to 3.5 in October with the total number of rigs on all types of work down from 37 to 14. Mene Grande reduced the number of active rigs in exploratory work from eight in January to none in October with a total decrease from 58 to 39 active rigs. The third major Venezuelan operator, Shell, has been maintaining the same number of rigs on exploratory drilling.

Well reports.—Creole's Alturitas wildcat south of Machiques in the Maracaibo basin is now below 13,000 ft. and is reported to have had encouraging shows. The same company is drilling below 7,000 ft. in its Curamichata well southwest of Cumarebo.

In La Paz field, Venezuelan Oil Concessions, Ltd. (Shell) recently completed two semiexploratory wells, according to the bulletin of the government Ministry of Fomento. P-104 was good for 10,750 bbl. daily, and P-105 for 2,956 bbl. daily.

Shell Caribbean Petroleum Co. is below 10,000 ft. with its DMC-1 well in the Mara area. Mene Grande Oil Co.'s Men 2, a field well, was reported completed for 10,170 bbl. daily, and its Melt 1 is being perforated at 10,308 ft. South of the lake, another Shell unit, Colon Development Co. has set 7-in. in CT-1. This well at 15,637 ft. holds the South American depth record. Drilling is continuing at Guasare 1 in the Amana area with Venezuelan Atlantic Refining Co. the operator for Guasare Oil Co. in which Lion Oil Co. holds a third interest.

In Eastern Venezuela, Creole recently completed as a producer its Oficina semiexploratory well OS-51. In Nipa field, Mene Grande brought in as producers semiexploratory wells WNZ-22 and ENZ-125. Socony-Vacuum Oil Co. of Venezuela's Pradera-1 in the Tascabana area is testing at total depth of 7,565 ft. Venezuelan Atlantic completed as a producer its semiexploratory Taman-7.

Sinclair Oil & Refining Co. is below 6,000 ft. in its SB-133 west of Santa Barbara, another semiexploratory well of interest. Phillips Oil Co.'s wildcat Santa 1 is below 10,000 ft. resuming drilling after an accident. In Las Mercedes, S.A.P. Las Mercedes has cemented $10^{3}/_{4}$-in. in its exploratory Mercedes-159 and is drilling ahead in Guavinita-8.

Creole has disclosed that its recently abandoned Santa Cruz wildcat was drilled at a cost of Bs. 4,250,000 (about $1,250,000). The well was spudded January 12, 1948, and reached a depth of more than 14,000 ft. before it was abandoned in September as dry.

Equipment Study

Material shipped into Venezuela shows gain

SIXTEEN oil companies imported equipment and other merchandise valued at $56,028,668 into Venezuela the first 3 months of 1949, according to a report of the Petroleum Bureau of the Ministry of Development.

The total was nearly $10,000,000 above the average of the two last quarters of 1948. The monthly average of oil-company imports was about $15,000,000 for all of 1948 against the average of $18,676,223 for the first three months of this year.

The equipment and materials imported by the oil companies the first quarter of this year weighed a total of 212,225,042 kg. (about 234,000 tons) and brought the government a total of Bs. 16,051,146 (about $4,820,000) in import duties. Equipment imported in the last half of 1948 totaled about 412,000 tons and yielded $10,700,000 in import duties.

Of the total imported the first quarter of 1949, 119,128,089 kg. was equipment and material on which duty was paid, 58,743,033 kg. was duty free, and 34,353,920 kg. was exempted. The ministry report also showed that dollar exchange purchased by the oil companies averaged $46,013,987 a month in the first quarter against $56,261,399 monthly in 1949. These totals include dollars for the sale of royalty oil.

Companies and the value of imports in the first quarter follow (figures in bolivars valued at 30.1 cents, U. S.):

Creole	71,766,000
The Shell Co.	13,960,073
Shell Caribbean	26,837,756
Venezuelan Oil Concessions	25,539,076
Colon Development	2,044,009
Venezuelan Oil Develop.	1,548,871
Venezuelan Oil & Transp.	1,740,392
Mene Grande	17,480,916
Venez. Gulf Refining	4,502,123
Socony-Vacuum	3,592,927
Atlantic Refining	4,310,290
Sinclair	764,754
Phillips	1,704,875
Texas Petroleum	1,665,334
Las Mercedes	970,382
Richmond Exploration	7,713,970
Total	186,141,753

New Argentina Plant

Argentine officials are reported preparing to let a contract in the near future for a new light-fraction recovery plant at Conesa on the Comodoro Rivadavia-Buenos Aires pipe line.

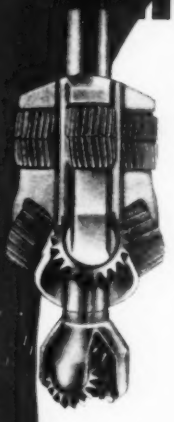
The plant, designed by Blaw-Knox Co., is to process approximately 1,000,000 cu. m. (35,300,000 cu. ft.) daily to produce propane, butane, and natural gasoline.

The gas will originate in Comodoro Rivadavia, and Conesa, about midway on the 1,055-mile, 10-in. line, is the general southerly limit for commercial motor traffic. The plant also will handle gas from the Plaza Huincul area, which is to be tied into the main pipe line later.

Gas is expected to start moving through the pipe line to Buenos Aires in January. The main compressor station at Comodoro Rivadavia was built by Agar Cross & Co., Ltd. Planning of the Plaza Huincul lateral line has not yet progressed to the specification stage.

H. C. SMITH

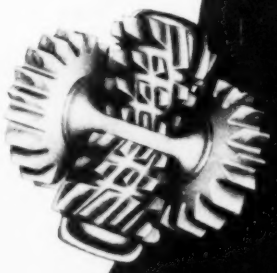
ROCK BITS & HOLE OPENERS



H. C. SMITH 6-POINT
HOLE OPENER WITH
ROCK BIT PILOT

H. C. SMITH 6-POINT
HOLE OPENER WITH
BULL NOSE PILOT

H. C. SMITH
4-POINT
ROCK BIT

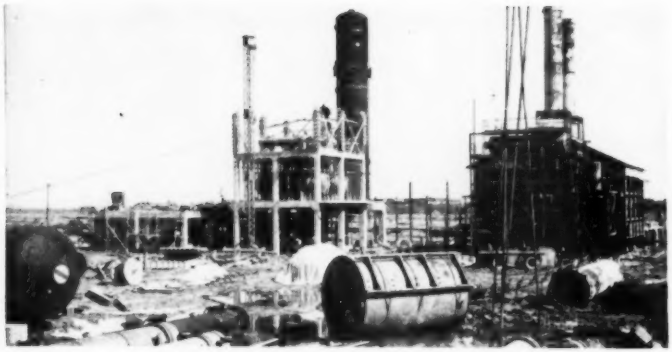


H. C. SMITH
TYPE K-2P
ROCK BIT

COMPTON

H C Smith
OIL TOOL CO.

CALIFORNIA



This view taken during construction last September shows the furnace, right, and the main fractionator, center

New Crude Units

Operation of one new Y.P.F. plant to begin in January

INITIAL operation of the first of two 25,000-bbl.-per-day crude distillation units will begin early in January at the La Plata refinery of Yacimiento Petroliferos Fiscales, Argentine state-owned oil company. The second unit is slated to begin operation in March or April.

Largely replacing existing crude facilities, the new units will maintain La Plata as the largest plant in Argentina and the third largest on the South American continent.

The crude units will charge all available crude from Comodoro Rivadavia, with makeup comprised of a light Oficina mix from eastern Venezuela. Comodoro crude has a 23° A.P.I. gravity and 0.21 per cent sulfur content by weight while the Oficina crudes have an average of 31.1° A.P.I. gravity and 0.81 per cent sulfur. Expected straightrun yields from the two crude units are shown in the accompanying table.

Crude charge will be preheated by exchange with overhead and side streams and reduced-crude bottoms, then flashed for removal of water and a maximum of 2.4 per cent light ends before charging to the 79,260 B.t.u. per hour Alcorn furnaces. Both crude heaters are equipped with gas and oil burners. By substitution of water tubes in the furnace convection sections, they double as steam generators.

The 19-tray fractionation towers will be lined from the eighth tray down. Caustic and doctor treating facilities for gasoline and kerosine fractions are being installed. Contract for engineering on the units was let to Catalytic Construction Co. of Philadelphia. William Velykis, an engineer with that company, will arrive in Argentina January 8 to supervise starting of the first unit.

EXPECTED CRUDE YIELDS

	Comodoro		Oficina	
	Bbl.	Vol. %	Bbl.	Vol. %
Crude	25,000	100.0	25,000	100.0
Gasoline (350° F. e.p.)	2,500	10.0	5,875	23.5
Kerosine (500° F. e.p.)	3,380	13.5	4,750	19.0
Gas oil (625° F. e.p.)	2,250	9.0	4,125	16.5
Residual	16,870	67.5	10,250	41.0

The common treating plant to serve both crude units will comprise a mercaptan extractor, the main vessel shown here during construction, a caustic regenerator mounted on the same substructure, and agitators, supports for which are shown at right

Commercial Output

Crude production from Cerro Manantiales field in southern Chile is scheduled to go on a regular commercial basis in the near future.

From early October, when production was begun, to the end of November a total of 3,748.9 cu. m. of crude was produced. This is the equivalent of about 23,600 bbl. The October total was 1,278.4 cu. m., and November, 2,470 cu. m.

A 43-mile, 8-in. pipe line to a terminal on the Straits of Magellan will carry the crude to offshore loading facilities. The first shipment is expected to be made in late January or early February.

Chile ultimately expects to build a refinery to utilize the oil. Meantime, the production is expected to go to Argentina or Uruguay, its nearest and most logical markets.

Concession Granted

Bahamas Exploration Co., Ltd., has been granted a concession to explore for oil over a 12,000-sq. mile area of British Honduras, according to a report from Guatemala.

The concession was granted for a 2-year period, subject to extension, and includes offshore rights. Bahamas Exploration was identified as a United States company in which the principal shareholder is Gulf Oil Co., Ltd.

New Mexican Pay

Mexican American Independent Oil Co.'s 1 Tortuguero, wildcat test being drilled in southern Veracruz, near Puerto Mexico, in the Isthmus region of Mexico, has found a deeper pay which on drill-stem test flowed at the rate of better than 5,000 bbl. per day. Depth is not reported.

This well had previously found a shallower pay, which tests indicated was good for about 1,200 bbl. per day. *(See The Oil and Gas Journal, December 1, 1949, page 52).* The 1 Tortuguero is located on the beach and drilled at an angle to reach an indicated salt dome off-shore. The first pay was reached at a total depth of

4,052 ft. (3,330 ft. vertically, 2,175 ft. horizontally), and on November 21, a drill-stem test flowed 48 bbl. of oil per hour through a ¼-in. choke.

The depth of the new pay is not yet available, but may be considerably deeper than the first pay. The drill-stem test is believed to have been taken about December 21 or 22, almost a month to the day from the first flow from the shallow sand. On December 2, the well was reported coring at total depth of 4,662 ft., or more than 600 ft. below the first pay.

Las Mercedes Financing

A plan to raise £1,000,000 ($2,800,000) to settle certain arrears in connection with its half interest in S.A.P. Las Mercedes has been announced in London by Ultramar Co., Ltd.

Through Caracas Petroleum, S. A., Ultramar shares interest with The Texas Co. in Las Mercedes, now producing about 17,000 bbl. daily from its fields in central Venezuela. Part of the requirements of Mercedes due from Ultramar have been advanced by Texaco.

FAR EAST

Rising Output

New wells in Japan adding to total crude production

WASHINGTON.—September production in Japan totaled 121,338 bbl., and the daily average of 4,044 bbl. was 164 bbl. above August output, according to a report from the general headquarters of the Supreme Commander for the Allied Powers at Tokyo.

Six oil and two gas wells were completed during the month and three new wells started, it was stated. New wells brought in during the first half of the year added 47,817 bbl. to the January-June production.

A report to SCAP by Dr. Lloyd W. Stephenson, visiting expert consultant, recommended continuance of the petroleum-resources development program, holding that present information indicates that petroleum will be produced for many years in northwestern Honshu and that there are possibilities of oil in commercial quantities in the Cretaceous sediments of Hokkaido.

About 100 geologists and geophysicists are now actively engaged in oil exploration, and two sets of gravity meters and two sets of seismograph equipment have been imported from the United States. The short-range program to develop new oil reserves to provide income to bolster the poor financial situation of the industry already has resulted in additional areas being proved as productive in four oil fields in Akita Prefecture and two in Niigata Prefecture, with a study of the geology of the areas surrounding some of the fields giving indications that deeper drilling might reveal the existence of additional reserves.

The long-range phase of the exploration program is directed toward a thorough survey of all possibilities of finding new oil in the present producing areas and other neighboring areas which are potentially petroliferous. One of the results of this phase of the program has been the discovery that oil may be present in the older rocks of Hokkaido, which have never before been tested by drilling. A deep test well is now under way, more than 3,000 ft. down toward the older rocks, which are thought to be at 6,000 ft.

(For detailed discussion of current operations in Japan, see The Oil and Gas Journal, December 1, page 47).

Rehabilitation in Burma

Reports last week indicated that the Burmese Government may supply one-third of the capital needed for the reconstruction of the oil industry in that country.

The arrangement would be a part of the government's plan for a "proposed joint working" of the industry together with the private British operating companies, principally Burmah Oil Co., Ltd.

The Burmese premier in Rangoon said the government hopes to buy a third of Burmah Oil's shares if present negotiations between the government and the company are successful. He described as "sheer nonsense" talk of confiscating the properties without compensation, pointing out the country itself did not possess the necessary equipment or technical skill to operate the industry.

Burmah Oil in London denied that acquisition of stocks formed any part of the government-company negotiations. The company chairman last summer said the government had proposed plans under which it would furnish the remaining working capital for the reconstruction of the industry, and the confidential discussions since in Rangoon presumably have been along these lines.

EUROPE

Boom in France

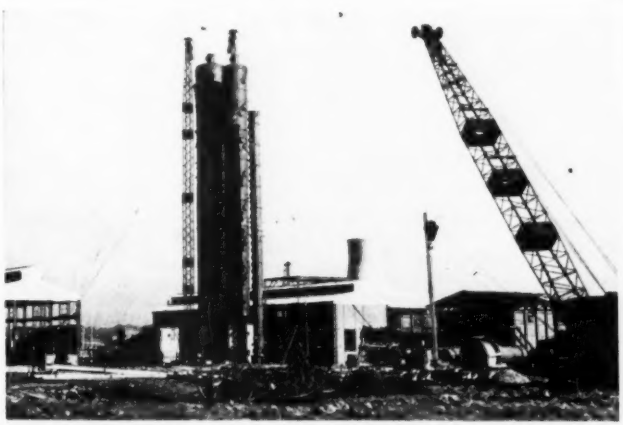
Lack of success doesn't slow high rate of drilling

MORE than 30 rotary rigs continue in operation throughout France and French Africa in the most intensive oil exploration program ever conducted in these areas.

The head of the central equipment-procurement agency for this program was in New York last week. He is Francois Emmanuelli, president-director general of S. N. Marep.

While there have been no outstanding successes thus far, the French exploration is expected to continue for some time to come. Emmanuelli said that France considers the work of thoroughly determining the oil possibilities of its territories in general only well started.

Equipment.—French and French Af-



AHEAD OF SCHEDULE.—A fractionating column is lowered into place in the new Stanlow refinery of the Shell Group near Ellesmere Port, Cheshire, England. Although not scheduled to go onstream until next year when it was begun early in 1948, the refinery already has commenced operations. The 20,000-bbl. plant will operate on Middle East crude

rican exploration since the war has resulted in the purchase of an estimated $14,000,000 in equipment in the United States. Most of this was in 1946 and 1947, and now by contract to French manufacturers, S. N. Marep is building up a small French equipment industry turning out largely replacement parts and expendable items necessary to keep the drilling equipment in operation. S. N. Marep has an enlarged engineering department to do design work. Emmanuelli pointed out France is preparing to make itself sufficient without United States assistance after 1952.

Companies.—Nine French exploration and production companies are the stockholders in S. N. Marep. Five of these companies are operating in France itself, and four in the African areas. Except for the privately owned Pechelbronn company, the French and African governments have large or controlling interest in these operating companies. A possible broadening of the French exploration may result from the application of the Standard Oil Co. (N. J.) organization for an exploration concession for a sizable area bordering on France's southern Atlantic Coast.

In continental France, there are now about 20 rigs running, of which six have been purchased in the United States since the war. Of these, three are operated by Soc. Nationale des Petroles de Languedoc Mediterraneen and two by Soc. Nationale des Petroles d'Aquitaine. The sixth is operated by Regie Autonome des Petroles. The Aquitaine and Languedoc companies are 55 per cent government owned, and R.A.P., 100 per cent. Six rigs are running in Morocco, three in Tunisia, two in Algeria, and two in Gabon in Equitorial Africa. The latest of the three rigs for Tunisia was only recently shipped.

Emmanuelli was in the United States in connection with the Economic Cooperation Administration assistance for the program. He was scheduled to return to Paris in mid-December.

Gasoline Derationed

Motor fuel has been removed from rationing restrictions in France and made cheaper for most consumers at the same time.

The government's derationing action left motor fuel with a maximum price in Paris of 46.8 francs a liter. Under the previous plan, it was sold at two prices, one a 63.22-franc price for nonpriority users.

It was also announced in Paris recently that France has prohibited the export of a number of strategic materials to countries behind the Iron Curtain. Included was aviation gasoline of 86 octane and higher, aviation lubricants, and line and drill pipe.

Greek Refinery Planned

Initial steps are being taken toward the construction of a 10,000-bbl. daily refinery in Greece which was provided for in the recent report of the oil committee of the Organization for European Economic Cooperation in Paris.

The plant outlined in the proposal comprised topping, thermal cracking and reforming units. Products were provided for as follows: motor gasoline, 26.25 per cent; white spirit, 0.25 per cent; kerosine, 5 per cent; gas-diesel oil, 22.5 per cent; and fuel oil, 33.5 per cent.

MIDDLE EAST

Boundary Riddle

Offshore potential poses problem for sheikhdoms

A NUMBER of complex and difficult boundary questions have arisen in the Persian Gulf as a result of intensive oil development.

The problem involves virtually all the governments with territory bordering on the Persian Gulf. While some land boundaries are vague, the most acute question at present is the ownership of certain offshore submerged areas.

Prior to the commencement of large-scale oil operations in such places as Saudi Arabia, Kuwait, Bahrein, and Qatar, there was no particular reason for exact boundary determination. But the realization that other highly productive reservoirs may underlie the shallow waters of the Persian Gulf has made the various governments aware of the importance of establishing their seaward jurisdiction.

The British Government exercises control over the Persian Gulf shiekhdoms, and efforts are now being made to work out a solution with British assistance. Saudi Arabia, with the longest stretch of coastline on the west, is the only wholly independent kingdom involved.

Decrees issued.—The pronouncement of King Ibn Saud of Saudi Arabia asserting control over outlying coastal seas was the first to be issued. It appeared in the official publication Omm Al Kora May 29.

In his decree, King Ibn Saud declared that the kingdom included the coastal sea outside the inland waters and extending seaward 6 nautical miles. The inland waters were defined as including bays and waters between the mainland and islands or shoals not more than 12 nautical miles distant. It established methods for determining base lines from which the coastal sea is measured.

The Saudi Arabian decree and those issued subsequently all contain a provision for boundary determination by agreement "in accordance with equitable principles" in cases where the areas claimed overlap the waters of another state.

A proclamation was issued by the sheikh of Qatar extending his exclusive jurisdiction and control over adjacent sea areas. Seaward boundaries, it said, are to be determined more precisely after consultation with neighboring states. Similar declarations were made by the sheikhs of Bahrein and those on the Trucial Coast—Abu Dhabi, Dubai, Sharjah, Umm el Quwain, and Ajman.

Companies involved.—Arabian American Oil Co. holds the Saudi Arabian concession and has done some offshore geophysical work. Most active company in offshore exploration work has been Bahrein Petroleum Co., Ltd., which holds the Bahrein concession. Bahrein itself is an island separated from Saudi Arabia by only about 13 miles of water. On the other side, the east, it is about 18 miles from the Qatar Peninsula.

Dukhan field, where commercial production is expected to begin for the first time in January, is on the southwest side of Qatar. The concession is held by the Iraq Petroleum Co., Ltd., Group. I.P.C. also holds rights on the Trucial Coast.

Superior Oil Co. and an English company obtained rights from the Qatar shiekh in August for the offshore areas. Just what this includes is a controversial point. I.P.C. reportedly takes the position its earlier concession for the entire shiekhdom included all territorial waters. The matter is to be arbitrated as provided in the contract.

Gathering System Expanded

Arabian American Oil Co.'s gathering system has been expanded by the inclusion of a newly constructed 314-mile segment of the 30-31-in. Trans-Arabian line.

The company said last week that the trans-Arabian pipe-line system was designed as a line having either a Persian Gulf or a Mediterranean outlet. The line accordingly was routed from the producing field at Abqaiq via Qatif where it connected with an Aramco line already in existence to the Ras Tanura refinery and the Ras Tanura shipping terminal on the Persian Gulf.

The 44-mile Abqaiq-Qatif section of the pipe-line system was completed for Aramco by Trans-Arabian Pipe Line Co. more than a year ago and has been in service delivering oil to Ras Tanura since that time. The balance of Aramco's gathering system to a pump station at Hafar al Batin now has been completed and linked to the Qatif-Hafar section.

PERSONALS

Gas Authority

Gardescu is an expert on natural-gas reserves

DR. IONEL I. GARDESCU, who was recently named a vice president of Transcontinental Gas Pipe Line Corp., Houston, is an authority on natural-gas reserves, and in his new position he will be in charge of gas reserves for the pipe-line firm.

Born in Romania, Gardescu came to the United States in 1920 and received his petroleum-engineering degree from the University of Pittsburgh 2 years later. In 1923 he returned to his native land as subsurface geologist for Standard Oil Co. (N. J.). Three years later he returned to the United States for postgraduate work at Stanford University, and the University of California. He received his Ph.D. degree in petroleum engineering from the latter institution in 1931.

In 1929 Dr. Gardescu joined the faculty of the University of Pittsburgh as professor of petroleum engineering, and at the same time became associated with Gulf Research & Development Corp. From 1934 to 1940 he did consulting work in Houston, and joined The Texas Co. in 1940 as senior petroleum engineer and geologist there. In 1946 he became associated with Ralph E. Davis, consulting gas engineer of Houston, specializing in reserves of availability of gas for major natural-gas pipe lines from the Gulf Coast region. He joined Transcontinental last January as manager of the gas-reserve department.

Elton E. Tucker, district petroleum engineer for Tide Water Associated Oil Co. at Conroe, Tex., has been transferred to the West Texas division with headquarters at Snyder, where he will serve as district foreman. **Louie C. Kirby,** district geologist at Tallahassee, has been transferred to Houston in the same capacity, where he is now engaged in a research assignment. Tucker is a graduate of Texas A. & M. College, and Kirby is a graduate of Louisiana State University.

A. M. Derrick, Jr., production engineer for Stanolind Oil & Gas Co. at Tulsa, has been transferred in the same capacity to the Wink, Tex., district, and **Warren G. Johnston,** petroleum engineer at Midland, has been moved to North Cowden, Tex.

Ed Riddle, Jr., Texas Pacific Coal & Oil Co. geologist at Midland, Tex., has been transferred to Sheridan, Wyo., to assist **C. G. Bailey,** chief geologist in the Rocky Mountain area.

Virgil H. Landers, production foreman for Skelly Oil Co. at Weleetka, Okla., has been transferred to the Lindsay, Okla., area in a similar capacity.

B. E. George, Lyons Oil Co., Lyons, Kans., was recently elected president of the Kansas Oil Men's Association, succeeding **C. C. Abercrombie,** Bernard, Kans.

J. E. Spurgin, driller for K. J. Manion at Seminole, Tex., is now serving as driller for J. R. Sharp Drilling Co. at Post, Tex.

Harry McDaniel, pipe-line superintendent of the Wichita district for Cities Service Gas Co., has been assigned to the Warrensburg, Mo., district as superintendent, replacing **Frank W. Harringer,** veteran superintendent who will retire from active duty at the end of the year. **K. A. Kimball,** superintendent at Lawrence, Kans., will transfer to Wichita to succeed McDaniel. **Ed Fitzpatrick,** pipe-line foreman of the Kansas City, Mo., district, will be transferred to Lawrence, Kans., as superintendent, and **Roy Bressie,** foreman at Pratt, Kans., will move to Kansas City, succeeding Fitzpatrick. **Pete Perkins,** Hutchinson, Kans., district, will transfer to Hutchinson to take over Bressie's former duties.

W. E. Lundie has been named manager of the Moose Jaw, Sask., refinery of British American Oil Co., Ltd., succeeding **Harold E. Hansen,** retired. **F. E. Doyle,** formerly lube-oil superintendent at the company's Clarkson, Ont., refinery, succeeds Lundie as assistant manager at Clarkson.

Leslie R. Neal, Jr., petroleum engineer at Corpus Christi for La Gloria Corp., has been moved to Falfurrias, Tex., in the same capacity.

Leslie D. Sellers, assistant district production foreman at Lindsay, Okla., for Sinclair Oil & Gas Co., has been named district foreman at that location. Other changes within the production department of the firm include: **Chester R. Richards,** petroleum engineer at Thrall, Kans., named assistant district foreman there; **Harold W. Shaner,** petroleum engineer at Ardmore, Okla., transferred to Midland, Tex.; **H. F. Defenbaugh,** senior petroleum engineer at Lindsay, Okla., named division petroleum engineer and transferred to Oklahoma City; **Ralph E. Smith,** district foreman at McPherson, Kans., named assistant district superintendent and transferred to Bristow, Okla.; **S. F. DeVore,** senior petroleum engineer at Shidler, Okla., transferred to Drumright, Okla., in the same capacity; **Jerry A. Moran,** assistant district foreman at Bairoil, Wyo., named district foreman there; **A. L. Lockhart,** pumper at Columbus, Tex., named assistant district foreman at that location; **Ellis T. Hammett,** petroleum engineer at Seminole, Okla., named senior petroleum engineer and moved to Arp, Tex.; **Charles J. Eskridge, Jr.,** petroleum engineer at Delaware, Okla., named senior petroleum engineer and transferred to Kiefer, Okla.; and **Charles L. Simmons,** petroleum engineer at Tulsa, transferred in the same capacity to Thrall, Kans.

JOHN R. DONNELL

John R. Donnell, assistant to the manager of production for Ohio Oil Co., Findlay, has been named treasurer of the company, succeeding **Charles H. Smith,** who has retired after 44 years of service. Donnell, a graduate of Case Institute of Technology, joined Ohio Oil in 1936 as a special representative and was appointed assistant to the production manager in 1944. A member of the American Petroleum Institute, Donnell is also a director and secretary of Rock River Petroleum Co.

Lorenz Shock, National Geophysical Co., Midland, Tex., who has been serving as temporary chairman of the newly formed Permian Basin Geophysical Society, has been elected president of the group for 1950. Other officers elected include: **C. Winn Payne,** Pure Oil Co., and **J. B. Worley,**

PERSONALS

Strawn Merchandise Co., vice presidents; **W. L. Homan,** Republic Exploration Co., secretary; and **E. L. Mount,** Continental Oil Co., treasurer.

J. G. Bartram, Tulsa, manager of Stanolind Oil & Gas Co.'s exploration department, has been named consulting geologist, and will be succeeded as head of exploration by **Charles T. Jones,** who has been serving as manager of the company's Central division with offices in Oklahoma City. Other changes include: **J. E. Swearingen,** formerly executive assistant to the vice president in charge of operations, named manager of the Central division; **George B. Jenkinson,** assistant manager of the foreign exploration department, named in charge of foreign exploration; **C. F. Schock,** division exploration superintendent in Canada, appointed manager of the Canadian division; **Dr. Donald G. Zink,** named general superintendent of the chemical-products department; and **Lawrence L. Smith,** appointed superintendent of Stanolind's new chemical plant at Brownsville, Tex. Bartram has been with Stanolind since 1932, and was named manager of the exploration department in 1947. Jones has been on the company's staff since 1934, and has served in many capacities in the exploration department. Swearingen joined the firm in 1947 as project engineer, and was made executive assistant to the vice president in charge of operations last January. Jenkinson has been with Stanolind since 1932, and in 1948 was appointed assistant manager of the foreign exploration department. Schock, who joined the company in 1941 as a landman, last January was named division exploration superintendent at Calgary, Alta., Canada. Zink joined the firm in 1947 and formerly was director of technical development for U. S. Industrial Chemicals, Inc. Smith has been with Stanolind since 1946, and served as chief synthesis project engineer before his recent appointment to the Brownsville plant.

C. T. JONES

J. G. BARTRAM

J. E. SWEARINGEN

G. B. JENKINSON

Sim H. Crews, petroleum engineer in the South Louisiana area for Gulf Oil Corp., Harvey, has been transferred to the company's Kilgore, Tex., office.

Visitors present at the December meeting of the Houston Chapter of Nomads included the following, from left to right: Don Meek, Mexican-American Independent Oil Co., Houston; Tom Buras, Kerr-McGee Oil Industries, Inc., Houston; Guy A. de Villeneuve, Mene Grande Oil Co., Barcelona, Venezuela; W. S. Crake, Shell Oil Co., Houston; A. W. Rhla, Shell Oil Co., Cairo, Egypt; Staley Kessinger, Creole Petroleum Corp., Maracaibo, Venezuela; W. A. Lambert, Reed Roller Bit Co., Maracaibo, Venezuela; and M. H. Hassan, Shell Oil Co., Cairo, Egypt. The first lifetime membership ever conferred by any Nomads chapter was presented to C. E. Whitney, one of the founders of the organization, by C. B. McDonald, president of the local group

Robert F. Herron, Oil Development Co., Amarillo, was recently elected president of the Panhandle Geological Society. Other officers include: **Robert B. Totten,** Sun Oil Co., vice president; **Raymond A. Fickel,** Sinclair Oil & Gas Co., treasurer; and **Miss Louise Jordan,** Sun Oil Co., secretary.

L. L. McDonald, division production engineer for the Rocky Mountain division of Pure Oil Co., has been named assistant chief production engineer at the company's Chicago headquarters. He is a graduate mechanical engineer from Purdue University, and joined Pure Oil in 1935. McDonald was named division production engineer in the Rocky Mountain area, with headquarters in Billings, Mont., in July 1948. Prior to that appointment he was in the engineering department in Tulsa.

W. D. Moore, who has been serving as associate petroleum engineer at Midland, Tex., for Humble Oil & Refining Co., has been moved to the Florey, Tex., area in the same capacity.

Charles Hissom, tool pusher and driller for Price Drilling Co., has been transferred from Minot, N. D., to Harlem, Mont.

Carroll A. Lake, who recently was appointed executive secretary of the Rocky Mountain Oil & Gas Association, has resigned, effective December 31. His successor has not been announced.

R. M. Donald has been appointed superintendent of the Longview, Alta., natural-gasoline plant of British American Oil Co., Ltd.

F. R. Yost, Tulsa, manager of production for Stanolind Oil & Gas Co. since February, has been named to the board of directors of the company. He has been in the oil business since 1934, and previously was with Yount-Lee Oil Co.

Don R. Gladney, right-of-way superintendent for Magnolia Pipe Line Co., and a member of the firm's board of directors, will retire from active service on January 1, after 36 years with the firm. **William Pilley** has been appointed to replace him as superintendent of the right-of-way and claims department.

E. J. Kieth, seismograph party chief for Continental Oil Co. at Plainview, Tex., has been transferred in the same capacity to the Seminole, Tex., area.

FRED E. SMITH

Fred E. Smith, for the past 6 years general superintendent of Ohio Oil Co.'s production department, has been appointed assistant manager of the production department. He first joined the company in 1914 as a warehouseman at Marshall, Ill. In 1916 he was transferred to Wyoming where he served as drilling foreman. Moved to Bakersfield, Calif., in 1927, Smith was placed in charge of Ohio's production operations in the San Joaquin Valley. Subsequently he was advanced to division superintendent of production for the Los Angeles division, and in 1944 he was called to the general offices in Findlay, Ohio, to become general superintendent of the production department.

William D. Mason, director in charge of industrial relations for Sun Oil Co., Philadelphia, will retire December 31 after 45 years in the petroleum industry. He will continue on the company's board of directors until the annual meeting of stockholders in April 1950. Mason will be succeeded by **William E. Zimmerman,** formerly manager of the industrial-relations department.

Roy M. Ferris, planning and scheduling section, engineering department of the Beaumont refinery of Magnolia Petroleum Co., has been elected chairman of the Sabine subsection of the American Society of Mechanical Engineers. **John Petkovsek,** also of the engineering department, was recently elected chairman of the Beaumont-Port Arthur chapter, Institute of Radio Engineers, and **Clyde B. Trevey,** engineer, was named secretary-treasurer.

Robert L. Sielaff, Sinclair Oil & Gas Co., has been elected president of the Rocky Mountain Association of Geologists. Others elected include: **George Downs,** Carter Oil Co., and **R. D. White,** California Co., vice presidents; and **R. C. Becker,** U. S. Geological Survey, Denver, secretary-treasurer.

Philip C. McConnell, manager of production, Arabian American Oil Co., is now en route to Dhahran, the company's operating headquarters in Saudi Arabia. McConnell spent several weeks on leave in the United States, part of which was devoted to a study of recent developments in production practices in this country. He is one of the veterans of the American operation on the Persian Gulf, his first connection being with Bahrein Petroleum Co., Ltd., which has a producing and refining operation on Bahrein Island.

Curtis M. Klaerner has assumed the position of chief process engineer at Magnolia Petroleum Co.'s Beaumont, Tex., refinery, replacing **Douglas N. Ezzell,** who has been transferred to the Arabian American Oil Co. to become superintendent of manufacturing at the Ras Tanura refinery on the Persian Gulf. **Eber H. Peters, Jr.,** replaces Klaerner as assistant chief process engineer.

C. M. Cotton, Jergins Oil Co.; **L. W. Saunders,** Independent Exploration Co.; and **John T. Pigott,** Kern County Land Co., were recently named new directors of the Western Oil & Gas Association. Officers who were re-elected include: **Reese H. Taylor,** president of Union Oil Co., Los Angeles, president; **William Reinhardt,** Union Pacific Railroad Co., first vice president; **William F. Humphrey,** Tide Water Associated Oil Co., second vice president; **L. K. Whittier,** Belridge Oil Co., treasurer; and **D. S. Kilgour,** secretary. **John M. Pierce,** formerly executive secretary, was named to the new post of vice president and general manager, and the position of executive secretary has been eliminated.

HAROLD DECKER

Harold Decker, vice president of Pan American Production Co., Houston, has been named president of Houston Oil Co. and Houston Pipe Line Co., succeeding the late George A. Hill, Jr. Decker was also named a director of the two firms, and will assume his new duties on January 1. He joined the Pan American companies in 1945, and formerly was with Rio Bravo Oil Co. and Seaboard Oil Co.

Clem F. Fain, reservoir engineer for The Texas Co. at New Iberia, La., has been transferred to New Orleans in the same capacity.

SHIFTS

Paul V. Haines, Midwestern Construction Co., Madison, Ind., to Jacksboro, Tex.; **Charles R. Criss,** engineer, Sohio Petroleum Co., Evansville, Ind., to Oklahoma City; **John R. Williams,** engineer, Sinclair Refining Co., Whiting, Ind., to Harvey, Ill.; **M. A. Hernandez,** superintendent, Lee-Laine Natural Gas Co., Barbourville, Ky., to New York City; **John H. Adams,** engineer, Carter Oil Co., Grand Rapids, Mich., to St. Elmo, Ill.; **Harry P. Dreher, Jr.,** engineer, Sohio Petroleum Co., Mount Pleasant, Mich., to Mount Vernon, Ill.

DEATHS

Walter L. McClanahan, 59, Grayling, Mich., oil producer who founded the McClanahan Oil Co., died December 25 at Sea Island, Ga.

Paul Schlosser, 50, consulting geologist, died December 18 at Denton, Tex. He served as district geologist for Phillips Petroleum Co. in San Angelo and Midland, Tex., for 19 years before ill health forced him to curtail his work with the firm.

W. H. Mandeville, 74, Tulsa, formerly with Eastern Oil Co. and Oklahoma Producing & Refining Co. until his retirement 10 years ago, died December 18.

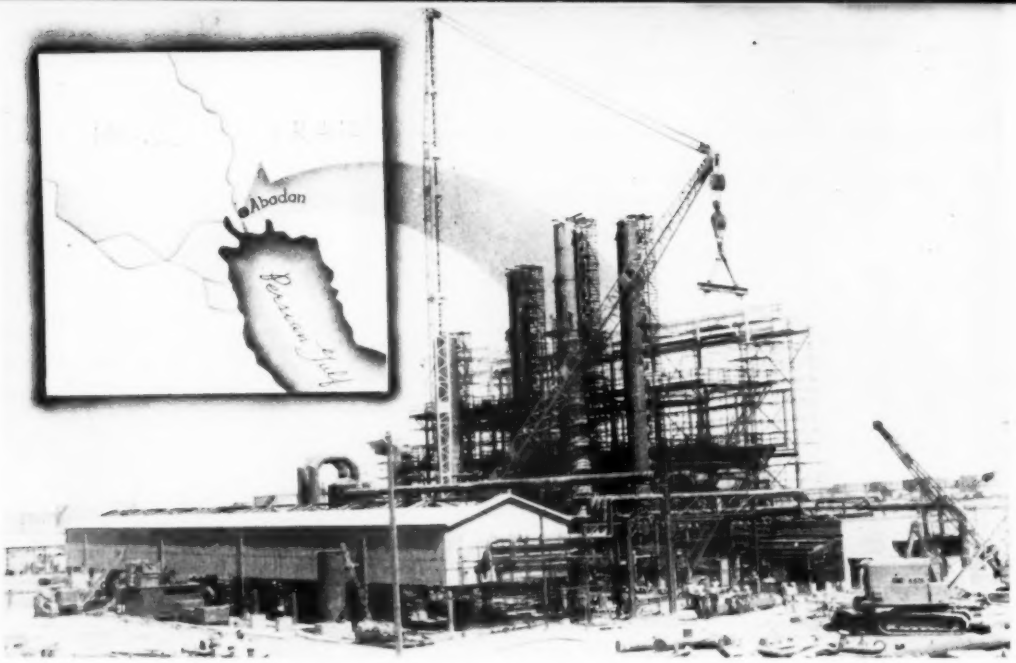
T. F. Rothwell, 66, veteran oil man and one of the partners in the old Yount-Lee Oil Co., died in Beaumont, Tex., December 15. He was credited with being one of the discoverers of the Spindletop field.

A. C. MacIntyre, 55, Oil City, Pa., former oil editor of The Oil City Derrick, and well known in the Pennsylvania oil industry, died December 22. MacIntyre had been editor of The Blizzard, afternoon Oil City newspaper, since 1941.

Herbert E. Nunnery, Jackson, Miss., special representative of the American Petroleum Industries Committee of A.P.I., died December 16. He was appointed executive secretary of the Mississippi Petroleum Industries Committee in 1933 and served in that capacity until 1942.

V. L. Porter, 63, assistant to the manager of the producing department, The Texas Co., Houston, died December 18.

Bert Wallace, 56, Lubbock, Tex., independent oil man, died December 19.



Catalytic cracking installation at Abadan refinery of Anglo-Iranian Oil Co., Ltd. Gas-recovery plant with compressor house is in foreground

WORLD'S LARGEST REFINERY will be equipped with CAT CRACKING UNIT

THE world's largest crude-oil refinery, the Abadan plant of Anglo-Iranian Oil Co., Ltd., in Iran, will soon be equipped with one of the late-type catalytic cracking units. Progress on construction of the new unit and related facilities indicates operations may be started during the early months of 1950.

On a design basis the refinery is set up to process 500,000 bbl. of crude oil daily. Thermal conversion facilities consist of a reforming installation rated at 125,000 bbl. daily. Current throughput of the Abadan refinery is slightly less than its half-million-barrel daily rating. Crude-oil distillation is obtained with atmospheric and vacuum equipment.

Capacity of existing facilities is sufficient to provide suitable and ample feed stock for the new catalytic unit. As originally planned the catalytic cracking plant was estimated to have a throughput rating of 24,500 bbl. per stream day at 55 per cent volume conversion or 29,000 bbl. at 45 per cent conversion, using a synthetic catalyst. Subsequent modifications of a minor nature are calculated to step up the unit's throughput capacity to 35,000 bbl. per stream day at 48 to 50 per cent volume conversion.

The Abadan catalytic cracker follows latest layout and design of similar units erected in United States to operate with crudes above average in sulfur content. Its design incorporates separate reactor and regenerator vessels, a fractionator, and feed preheater all of which are in line with practices current at the time the unit was planned. Catalyst coolers, the waste-heat boilers, and electrical precipitator are also designed and installed in accordance with prevailing practice.

Both the reactor and the regenerator are fitted with single-stage cyclone separators. The separator in the reactor is constructed of alloy. Each of the catalyst hoppers for fresh and hot storage is designed to hold the full catalyst inventory. Refractory lining is employed in the used catalyst hopper.

To protect the reactor shell and other pressure parts from corrosion the vessel was constructed of 11-13 chrome-clad plate. Similar protective measures were employed in constructing the fractionator. However, instead of using clad plate in constructing the fractionator its lower section is protected with an alloy lining. Monel lining is used in the upper section of the fractionator as a further safeguard from corrosion.

All of the main pumps and the single centrifugal compressor in the catalytic plant are steam-turbine driven. Superheat for the steam supplied from operations of the catalytic unit is obtained with a fired unit, separate but near the cracker. The refinery's regular steam system is tied into the catalytic unit's waste-heat boilers, and other steam-generating equipment. Depending on operations of the catalytic plant, steam from the waste-heat boilers is supplied to the refinery distribution system for operations other than at the catalytic unit or steam may be obtained from other sources via the regular plant system for operations at the cracker.

To obtain suitable water in large volume from an adjacent river, a

circulating system was installed in connection with a forced-draft cooling tower. This arrangement appreciably lowers the duty on the settling plant. To avoid contamination of the cooling water in event of failure in any of the tubular cooling equipment handling the heavy oil an A.P.I.-type separator is installed in the circulating system. Effluent water from these tubular coolers passes through the separator before it is run to the cooling towers.

Evaporators are employed to insure high-purity water for the cracking-plant steam generators. High-purity water is also used to condition the flue gases passing to the electrical precipitator. Evaporated water is also used for spraying generated flue gas to forestall catalyst poisoning from that source.

Gas-Recovery Plant

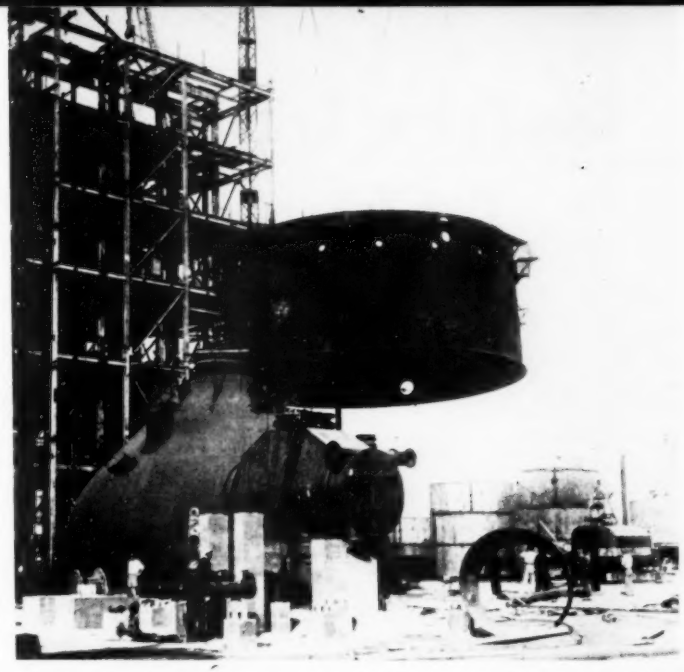
Design of the gas-recovery plant which is to be operated in conjunction with the cracker is the usual absorption type. In addition to its depropanizer, debutanizer, and other equipment it is provided with a gasoline splitter which yields light and heavy gasoline fractions. To accommodate utilization of certain existing equipment the absorber is designed to operate at approximately 52 psi. Refrigeration for this relatively low-pressure operation is supplied by an ammonia absorption system.

The main gas supply for firing the catalytic feed preheater and the steam superheater is obtained from the plant's absorber. To insure a sufficient supply of gas at all times for these operations, the absorber overhead gas stream is tied into the refinery's regular fuel-gas system. In emergency both heaters may be fired with oil. Gas for compressor engine fuel is provided from operations of an alkylation unit since the fuel for operation of the engines is required to meet a comparatively high standard of purity.

Other Facilities

Because the Abadan refinery is remote to supply sources large quantities of catalyst, ammonia, and other materials are kept on hand at the refinery. Catalyst is stored adjacent to the cracking plant's hoppers and the ammonia is stored on specially constructed racks provided with a traveling crane to facilitate handling of the large drums. Estimates show that approximately 1,000 tons of catalyst will be consumed annually. For charging the unit 300 tons of catalyst are required.

Since Abadan is a considerable distance from any source of supply of catalyst, it was considered essential to provide storage for an adequate quantity. A store for this purpose is situated adjacent to the catalyst storage hoppers, provided with suitable rail access. A stacking machine has been supplied to facilitate the handling of the catalyst drums within the store and to the point of discharge to the catalyst elevating system.



Bottom cone and skirt of the Abadan cat cracker. The former weighs more than 100 tons and the latter 75 tons

Again, as there is no local source of the ammonia required for the refrigeration plant and the conditioning of the flue gases available in Abadan, a separate ammonia store has been built in a convenient location. This is equipped with specially designed racks and an overhead crane to facilitate the handling of the ammonia cylinders. A point of interest in this connection is that the cylinders are of 8-cwt. capacity each and are some of the largest ever made in the United Kingdom for overseas transportation.

Auxiliary buildings include the main office and laboratory, maintenance workshops, and electrical substation. The office and laboratory form one block and are air-conditioned as is the catalytic unit control room. Sufficient apparatus and space is provided in the laboratory to cover full normal routine testing and control of the catalytic cracker and gas plant products.

On a design basis the catalytic unit will produce: Gas and gasoline (to 400 F. end point), gas oil, cycle oil, and clarified oil.

The gas and gasoline stream (amounting to about 45 per cent by weight of the fresh feed) will be processed in the gas plant. In this operation 90 per cent of the butenes/butanes suitable for subsequent alkylation will be recovered. Provision is made for 50 per cent of the total propene-propane in the gas to be recovered as a separate stream containing about half the H_2S produced in the cracker. Tail gas from the absorber units will be led to the fuel system.

The debutanized gasoline (approximately 31 per cent by weight of the fresh feed) is to be passed to the splitter column in which light gasoline of 200 -260 F. end point can be taken as an overhead product. Facilities for caustic washing the two gasoline streams before they are run to intermediate storage will also be provided as an integral part of the unit. After subsequent treatment the octane number of the total debutanized gasoline is estimated to be at least 80 clear.

The gas-oil stream (19 per cent weight of feed) is to be steam-stripped before passing to storage. This product is expected to have a pour point of 0-5 F. and after treatment will be suitable for use as a fuel-diesel blending stock.

Cycle oil (23 per cent weight of feed) will, in general, be employed as a fuel-oil blend stock due to the availability of sufficient fresh feed it is not excepted that any of the cycle oil will be recycled to the cracker. The operation is thus of the single-pass type. The only period in which shortage of fresh feed stock is anticipated is during shutdown of the vacuum distillation units, and in this case the cycle oil stream can be recycled to the unit. Clarified oil from the thickener (8 per cent weight of feed) will in all cases be used as a fuel-oil blend component.

Gas-Drive, Gravity-Segregation, and Gas-Injection Calculations

. . . applied to the L_1 Sand, "D" Segment Reservoir, Oficina Field, Venezuela

by L. J. Wickenhauser*

THE L_1-sand "D"-segment reservoir of Oficina field[1] in Eastern Venezuela is fairly large, had an initial gas cap, is sealed on all sides by faulting or pinchout, and has a reasonably complete production history. These factors have combined to afford an interesting study of gas drive and gravity segregation phenomena. The reservoir is operated by Mene Grande Oil Co.

The L_1 sand is only one of the many productive sands of Oficina field; it lies at a depth of some 5,000 ft. subsurface. Isopachous maps show this particular sand horizon to be a north-south trending "channel" development. Net sand thickness varies from some 10 ft. along the edges of the channel, up to some 60 ft. in the center. Regional dip is to the north and is only about 2°. Faults that cut directly or obliquely across this channel have resulted in several structural-stratigraphic traps in the Oficina area favorable for accumulations of oil.

The largest of these lies at the south end of the field and is known as the "D"-segment reservoir. This reservoir covers an area of 3,525 acres and contains 127,300 acre-ft. of sand of which 13,200 acre-ft. was original gas cap. L_1 sand pay is fairly soft, coarse grained, gritty, and poorly sorted. It has an average porosity of about 24 per cent. Permeability is dependent upon position. In the center of the channel where the sand is thickest and best developed, permeabilities are of an order of 1 darcy, but permeability decreases sharply as the more shaly edges of the channel are approached. Over-all connate-water content as calculated from electric-log studies is about 18 per cent.

The reservoir was discovered in June 1940, and to February 1949 had produced 33,172,000 bbl. of oil. A total of 82 wells were drilled on a 350-m. equilateral triangle grid, allowing a drainage area of 26.2 acres per well. The crude produced has a gravity of 36° to 38° A.P.I. and a viscosity of 36 cp. at 100° F. Curves plotting the physical characteristics of the reservoir oil and gas are given in Fig. 2.

The reservoir has been producing by a combined gas expansion-gravity segregation mechanics with most of the wells being influenced by the gravity segregation. No natural water drive exists. Material-balance calculations for oil initially in place give fairly consistent results which average 128,000,000 bbl. of stock-tank oil. This value checks well with calculations by the static method. Table 1 presents material-balance data.

Average daily oil production per producing well was held to 200 to 300 bbl. per day over most of the reservoir life. More than one-half of the original wells are still producing, and cumulative recovery as of February 1949 was 26.5 per cent of the total oil initially in place or about 290 bbl. per acre-foot of oil sand. A produc-

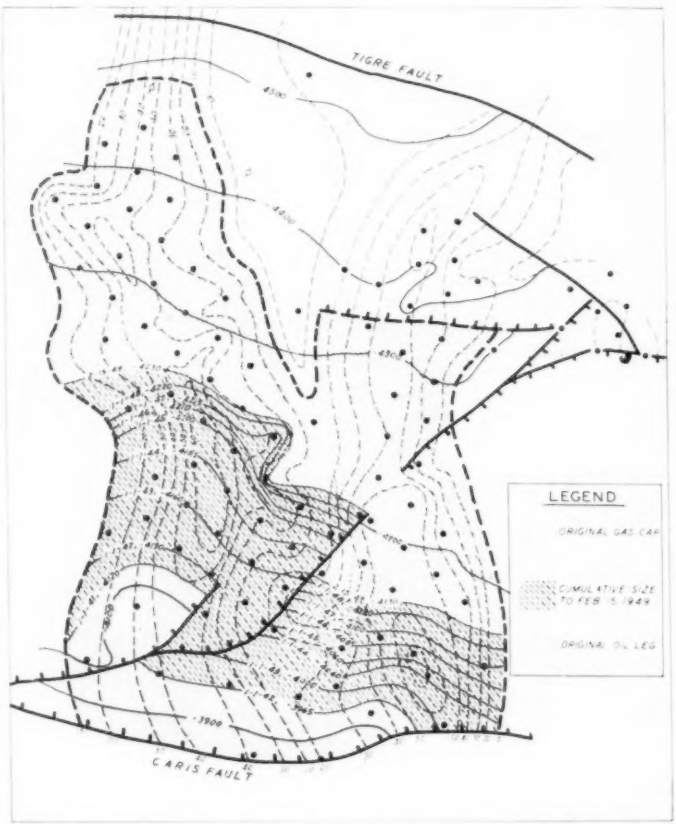


Fig. 1—Structural and isopachous map of the L_1 sand, Oficina field, showing position of original gas cap and its rate of migration. Limits of the field are established by the faults shown or by porosity pinchout. No natural water drive exists. A water-oil contact has been established in the narrow channel in the upper left portion of the drawing, paralleling the —4,500-ft. contour

[1]Petroleum engineer, Mene Grande Oil Co., C.A., Venezuela.

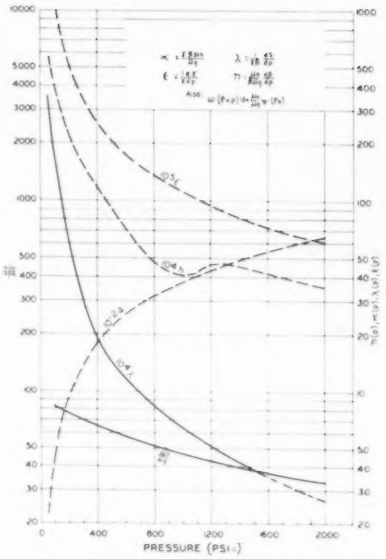
tion policy of closing in individual wells if and when their gas-oil ratios became excessive, was adopted early in the life of the reservoir with the result that the gas-oil ratio of the reservoir as a whole has remained low—greatly conserving reservoir energy.

At the time when 26.5 per cent of the initial oil in place had been recovered, the cumulative production gas-oil ratio was only 897 cu. ft. per barrel and the current production gas-oil ratio was only 1,200. When the reservoir, because of war restrictions, was subjected to a closed-in period of 10 months (September 1942 to July 1943) the average gas-oil ratio per barrel of production declined and remained low for a 3-year producing period thereafter. The size of the gas cap obviously increased during this closed-in period. This was an indication of gas migration and consequently of gravity segregation.

Fig. 1 shows the size of the initial gas cap. When, in the course of production, the main gas cap touched a well, the producing gas-oil ratio of that well would rise sharply. By studying the dates as to when updip wells went to high gas-oil ratio, the downward expansion of this gas cap was followed. Annual rings of gas cap growth are indicated on Fig. 1.

This additional gas being added to the gas cap migrated from the oil zone to the gas cap at a rate dependent on the rate of oil production. It came from reservoir oil downdip where it had been released from solution by the over-all pressure decline. This gas seems to have migrated updip along channels, and several structurally low wells apparently went to high gas-oil ratio at a very early date because their location happened to be in or near one of these gas channels.

In order for this migration of gas to have occurred, pressure gradients toward producing wells must have been less than the buoyancy forces that moved this gas updip; otherwise it would have gone to producing wells. From interference tests and drawdown data, producing pressure gradients are known to be low, so the above condition is believed to be satisfied.



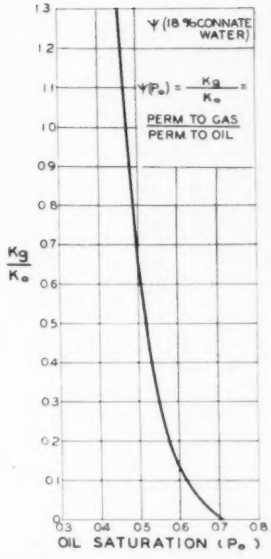


Fig. 3—(Left) Curves of functions used in making reservoir calculations. Fig. 4—(Right) Permeability-saturation curve for reservoir calculations

TABLE 1—L, SAND "D" SEGMENT OFICINA FIELD MATERIAL-BALANCE CALCULATIONS

Date month ending	Pressure, psig.	Cum. oil production (1,000 bbl.)	Cum. gas oil ratio (cu. ft./bbl.)	Cum. gas injected, M.c.f.	S. T. oil originally in reservoir (million bbl.)
Initial	1,910	0	0		
6/41	1,755	3,840	802		107
9/41	1,693	5,700	801		108
12/41	1,624	7,710	840		113
3/42	1,572	9,340	907		136
6/42	1,536	10,640	931		124
12/42	1,531	11,310	936	16,230	134
3/43	1,523	11,600	941	41,365	136
6/43	1,523	11,830	942	99,584	139
9/43	1,507	12,630	938	166,500	139
5/44	1,443	15,410	902	231,400	136
4/45	1,328	19,600	891	231,400	128
9/45	1,314	21,340	880	231,400	134
12/45	1,298	22,400	877	231,400	137
3/46	1,280	23,330	868	231,400	139
9/46	1,216	25,100	855	231,400	124
12/46	1,192	25,990	854	231,400	122
4/47	1,181	27,140	860	231,400	127
12/47	1,110	29,540	865	231,400	121
7/48	1,062	31,382	877	231,000	118
2/49	1,049	33,172	897	1,495,000	121
					Avg. 128

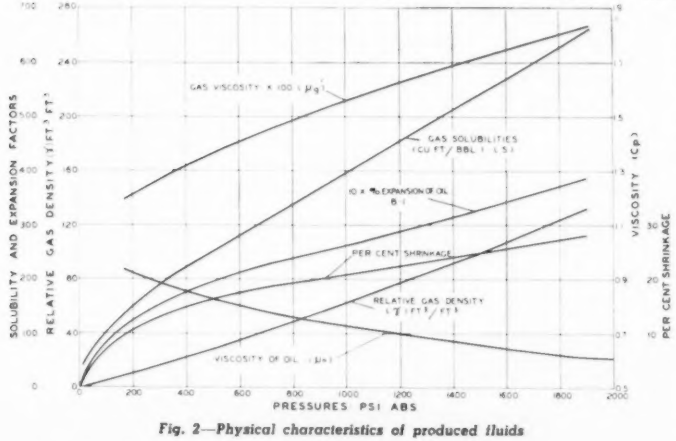


Fig. 2—Physical characteristics of produced fluids

Reserve Calculations

In order to apply the fundamental gas-drive equations, certain information and assumptions were necessary. Geological evidence plus field performance firmly deny the possibility of any water drive. Values of average porosity (24 per cent), connate water (18 per cent), and original oil saturation in the initial gas cap (15 per cent) were estimated or measured. The connate water was assumed to be immobile and to average 18 per

cent in both the oil and gas columns. Curves showing reservoir characteristics of the oil and gas were prepared, Fig. 2.

These curves were used in calculating the volume of oil initially in place by material balance and also were used in later gas-drive calculations. The initial oil and gas columns were planimetered from the structural-isopach maps. Using the above information, the reservoir pore volume of the oil and gas areas was calculated by the static method. The initial size of the gas cap and the size of the cap at various intervals throughout the producing life were carefully measured as these measurements were very important in the calculations for a gas drive reservoir with gravity segregation.

With the above information and the pressure-production picture, enough information was available to apply mathematically the basic formulas for the differential solution of gas-drive reservoirs.[2] The fundamental differential equations used in the calculations are as follows:

Equation 1:

$$W\ (\rho_o, p)\ \frac{\alpha\ \rho_o}{\alpha\ p} = \rho_o\ \lambda\ (p)$$

$$(1 - \rho_o - \rho_w)\ \epsilon\ (p) + \rho_o\ \psi\ (\rho_o)\ \eta\ (p)$$

Equation 2:

$$R = S + \alpha\ (p)\ \psi\ (\rho_o)$$

Equations 1 and 2 are basic equations solving for oil saturation and gas-oil ratio at different pressure intervals. These equations take into account oil saturation and permeability relationships. The first differential equation was solved for the various values of ρ_o (oil saturation in oil column). The second equation solves for the theoretical gas-oil ratio at a particular oil saturation and pressure.

Equation 3:

$$h' [\sigma\ (1 - r)\ (1 - \rho_w) + \varsigma\ (\frac{r\ \rho_o}{\beta} - \rho'_{oz})]$$

$$= \sigma_i\ (1 - \rho_w)\ [r\ (1 - h'_i) + h'_i]$$

$$- \rho'_{oz}\ \varsigma\ h'_i - r\ (1 - h'_i)\ \rho_{oi}\ \varsigma_i/\beta_i$$

$$- (\rho'_{oz} - \rho'_{oi})\ h'_i\ \varsigma - r\ \sigma\ (1 - \rho_w)$$

$$+ r\ \rho_o\ \varsigma/\beta$$

Equation 3 relates the thickness of the gas cap to a particular oil saturation, pressure recording, and rate of gas return to the gas cap.

Equation 4:

Cumulative recovery

$$(1 - h'_i)\ (\rho_o/\beta)_i - (1 - h')\ \rho_o/\beta$$

$$- (h' - h'_i)\ \rho'_{oz}$$

Equation 5:

Equations 4 and 5 relate the cumulative and ultimate oil recovery to oil saturation and gas cap thickness.

Ultimate recovery

$$(1 - h'_i)\ [(\rho_o/\beta)_i - \rho'_{oz}]$$

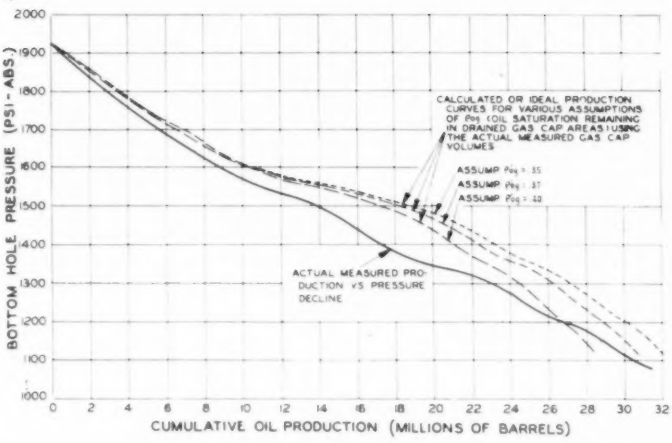

BOTTOM HOLE PRESSURE (PSI-ABS.)
CUMULATIVE OIL PRODUCTION (MILLIONS OF BARRELS)
CALCULATED OR IDEAL PRODUCTION CURVES FOR VARIOUS ASSUMPTIONS OF ρ_{wi} (OIL SATURATION REMAINING IN DRAINED GAS CAP AREAS) USING THE ACTUAL MEASURED GAS CAP VOLUMES
ASSUMP ρ_{wi} = .55
ASSUMP ρ_{wi} = .37
ASSUMP ρ_{wi} = .40
ACTUAL MEASURED PRODUCTION VS PRESSURE DECLINE

Fig. 5—Calculated and measured bottom-hole pressure curves

Nomenclature

o, g, w, i = subscripts denoting oil, gas, water, and initial
ρ = residual saturation expressed as per cent of the pore volume
p = pressure, psia.
S = solubility of the gas in oil, cu. ft. per cu. ft.
μ = viscosity in centipoises
β = formation volume factor (reservoir volume occupied by a unit volume of oil at stock-tank pressure)
σ = relative gas density or the volume of gas at stock-tank pressure required to occupy 1 cu. ft of space at reservoir conditions
$\alpha, \lambda, \epsilon, \eta$ = numerical functions of pressure
$\psi\ (\rho_o)$ = relative permeability ratio
r = decimal fraction of produced gas returned to gas cap
h' = fractional thickness of the reservoir occupied by gas or the gas-cap thickness divided by the total thickness
ρ'_{oz} = residual (stock-tank) oil saturation in the drained gas cap, i.e. $(h' - h'_i)$, expressed in per cent of pore volume
ρ'_{oi} = residual (stock-tank) oil saturation in the initial free gas cap expressed in per cent of pore space
$\varsigma = \sigma\ \beta - s$ = parameter expressing the shrinkage value of the oil itself

As the terms of Equation 1 are partial differentials of pressure, these functions were plotted numerically in Fig. 3 to facilitate solving. Fig. 4 shows the permeability-saturation relationship as defined by the function $\psi\ (\rho_o)$. This is the relative permeability to gas divided by the relative permeability to oil at a given oil saturation. With values from each of the preceding functions, the differential Equation 1 was solved numerically for ρ_o (the residual-oil saturation in the oil column) by using differential pressure intervals of 50 psi. By inserting these values into Equations 2

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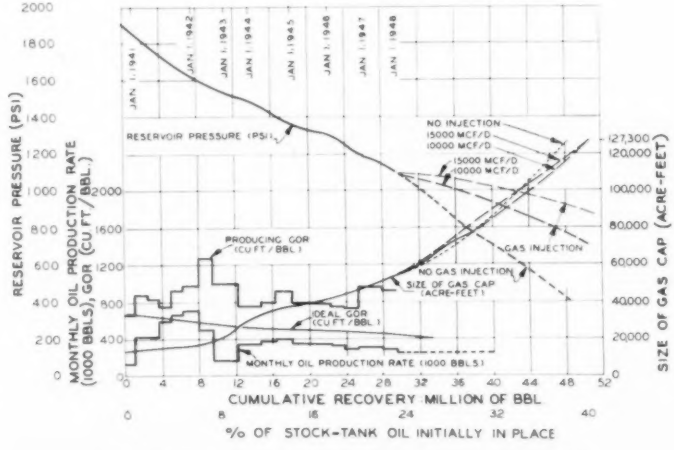

Fig. 6—Measured and projected production curves for Oficina field

AIRBORNE Magnetometer Profiles...

Across Cuyama Valley ... with interpretative comments

by H. Wayne Hoylman*

DURING August 1948, Fairchild Aerial Surveys, Inc., airborne magnetometer division, flew several hundred miles of experimental profiles in and around the present producing area in Cuyama Valley. These profiles were spaced approximately 1 mile apart. The flight direction of the profiles is, in general, northeast-southwest; they cross the San Andres fault on the northeast, and extend over 20 miles to the southwest, crossing the Nacimiento fault. (See map, Fig. 1).

*Chief geophysicist, Fairchild Aerial Surveys, Inc.

The flight altitude of the profiles is 6,000 ft. above sea level. This altitude permitted clearing the Caliente Ridge by only 500 ft., although the height above Cuyama Valley and the Carrizo Plains proper averaged nearly 4,000 ft. Extremely turbulent air was encountered in the vicinity of the Caliente Range which added to the difficulty in navigating this mountainous terrain.

As the magnetic conditions varied considerably in this area, three representative profiles have been selected to show the magnetic conditions observed, and to set forth the most plausible interpretation of varied geological conditions that can so often be made from the very limited amount of magnetic data as given by isolated profiles. On the map, Fig. 1, the positions of the three representative profiles are shown.

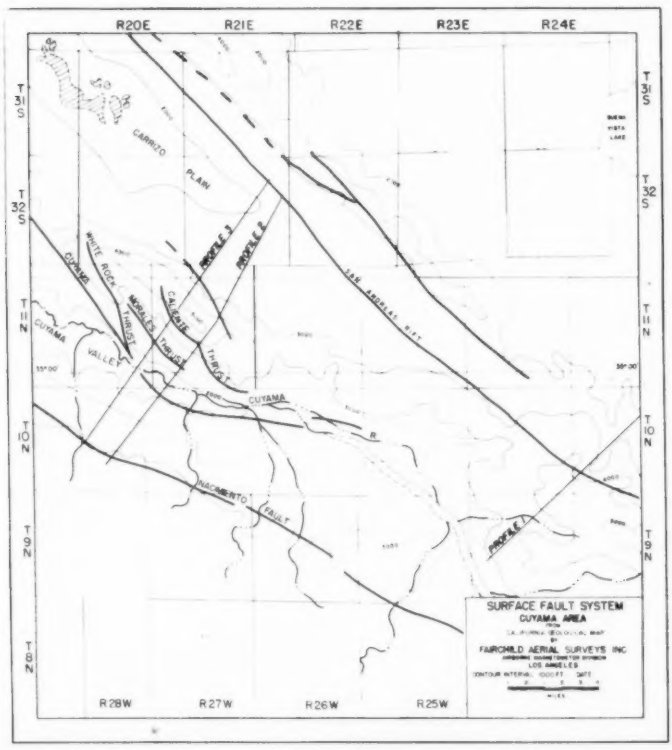

Fig. 1

Basic Theoretical Magnetic Conditions

In order better to understand the observed magnetic conditions indicated on the respective profiles, it is deemed advisable first to discuss certain theoretical conditions which are associated with some simple geological conditions. For illustrative purposes, the earth's magnetic field may be divided into several parts. However, only the two more important portions are discussed.

1. **Primary field.**—This is the magnetic intensity which arises from the basement complex either igneous or metamorphic. This magnetized material gives rise to the major portion of the earth's magnetic field.

2. **Secondary field.**—This is the magnetic intensity, considerably weaker than the primary field, due to the magnetic material within the sedimentary section. The iron-bearing minerals in shales and sandstones produce a weak magnetic field in the sediments.

Fig. 2 has been prepared to illustrate the two subdivisions of the earth's magnetic field, and also show how they may be combined to produce the total magnetic intensity observed by the airborne magnetometer. This is a simplified geological cross-section, as compared to geological conditions in Cuyama Valley, but is prepared to show structural deformation in the sediments, as well as faulting in the basement.

In curve 1 of Fig. 2, which repre-

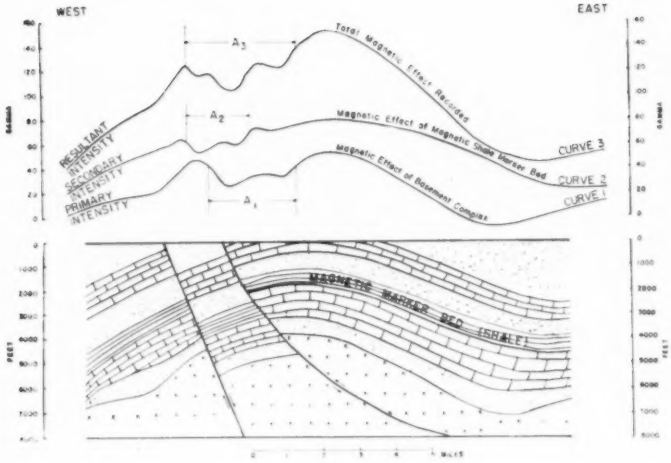

Fig. 2

sents the primary intensity as based upon the cross-section of the basement rocks, two things are of special note, as follows:

1. The undulations of the magnetic curve in the area, designated as A_1, is a reflection of the basement where a graben has developed as a result of an overthrust and normal faulting.

2. The smoother portion of the curve, to the right of the "A_1" portion, reflects the greater depth to the basement complex than to the left.

Curve 2 of Fig. 2 represents the secondary intensity, based upon the magnetic shale marker bed that exists in the sedimentary section approximately 2,000 ft. above the basement. The interesting portion of this curve is that portion designated as "A_2". It is the reflection of a graben developed by normal and overthrust faults. It is to be especially noted that the magnetic relief of this bed is much less than the primary intensity as shown by curve 1.

Curve 3 of Fig. 2 represents the total intensity observed by the airborne magnetometer flown at a reasonable height above the average level of the cross-section. This curve is the result, thoretically, of adding curves 1 and 2 together. It should be pointed out, however, that in the event the airborne magnetometer is flown at too great a height above the surface of the ground the greater portion, if not all, of the secondary intensity (curve 2) would be lost due to the fact that the shale is only approximately 1,000 ft. in thickness. Such a height, in general, would be approximately 4,000 to 5,000 ft. above the average level of the shale marker bed. If, however, the shale was 2,000 ft. thick, perhaps the height at which it would be undetectable by the magnetometer would be 8,000 to 9,000 ft., especially if the amount of structure is as great as shown in this cross-section.

It is suggested that the general shapes of these curves be kept in mind while reviewing the next three profiles, which are actually observed aeromagnetic profiles across the Cuyama Valley.

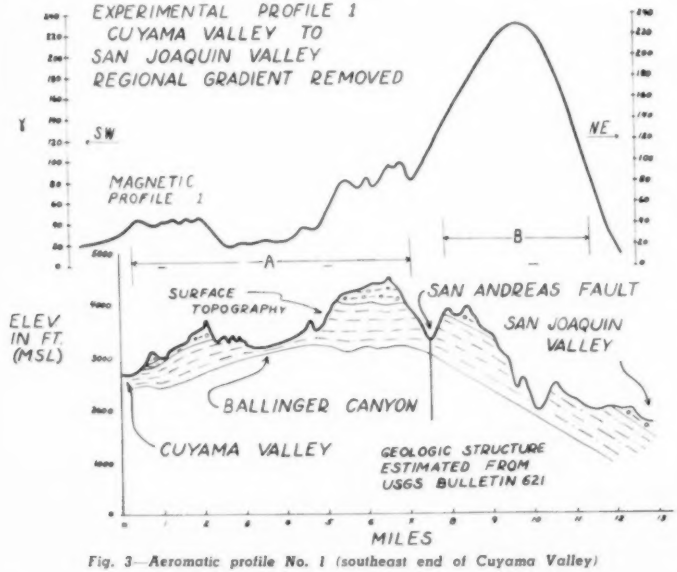

Fig. 3—Aeromatic profile No. 1 (southeast end of Cuyama Valley)

Aeromatic Profile No. 1

Attention is called to the fact that on the map this No. 1 profile is located in T9-10N, R23-24E, which is considered the southeast end of the Cuyama Valley proper. The most interesting portion of this profile is that designated as "Section A" at the left-hand side. The magnetic profile is positioned above the geological cross-section which is along the track of the magnetic profile.

The important thing to note in the "A" section of the magnetic profile is the similarity of the surface topography. In recalling the geological conditions indicated in Fig. 2, it would seem that here we have one of two conditions, as follows:

1. Because of the relief of the undulations in Section "A," it is possible to interpret the magnetics as implying basement topography that is faulted, with a graben existing in a portion of Ballinger Canyon.

2. A second interpretation would be that the sediments are also magnetic, and, therefore, add to the basement primary intensity, which give rise to the small undulations associated with the primary field.

As for the "B" portion of the magnetic curve, it is apparent that it is reflecting a different condition in the basement complex. Plausible interpretations of this portion of the curve are as follows:

1. From the smoothness of the curve it is interpreted that the surface topography is nonmagnetic and is, therefore, not producing any secondary field detectable with the airborne magnetometer.

2. Because of the great amount of relief, approximately 200 gamma, it seems quite likely that this amount of relief is not reflecting variation in the topography of the basement complex, but rather that it is indicative of a change in the chemical composition of the basement rocks. This is more commonly referred to as a change in susceptibility of the basement complex. Such a change is based generally on the variation of the per-

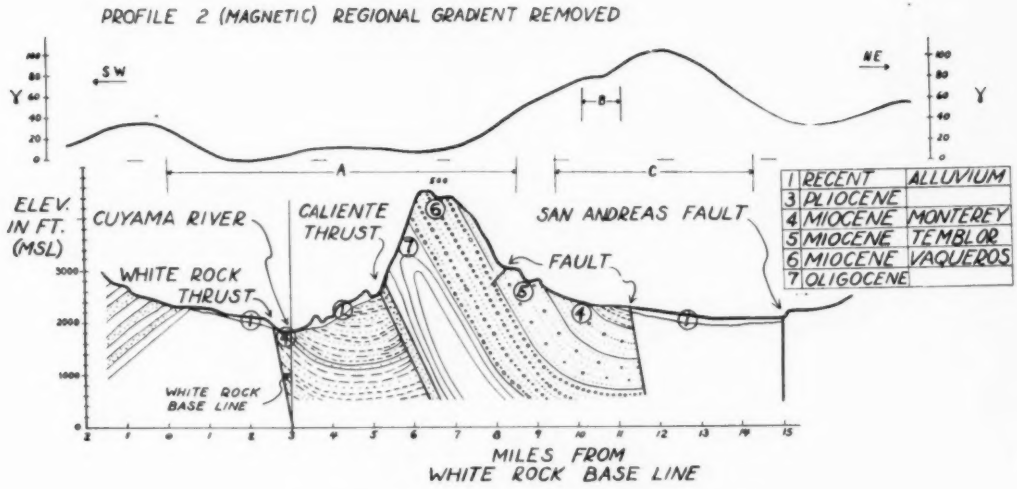

Fig. 4—Aeromatic profile No. 2 (vicinity of Russell Ranch oil field)

centage of iron bearing magnetic minerals such as magnetite, ilmenite, wolframite, hornblend, etc., in the basement rock.

3. From the variation in intensity on opposite sides of the San Andres fault, it is reasoned that different types of basement rocks exist, with the more basic material located on the right hand side or to the northeast of the fault.

Aeromatic Profile No. 2

On the map airborne magnetometer profile No. 2 is located in the vicinity of Russell Ranch oil field, and as a matter of fact does cross the field. The geological conditions implied from this magnetic profile are vastly different from those implied by profile No. 1. The plausible geological conditions indicated by this profile are as follows:

1. In the portion of the curve designated as "A" we have a possible graben some 8 or 9 miles in cross-section. Upon this graben appears to be superimposed a small magnetic high that would indicate basement relief that might be of sufficent magnitude to produce structure in the overlying sediments. This latter condition, however, is quite speculative.

2. The small break in the magnetic slope noted in the "B" section of the curve, implies that a small basement fault exists.

3. The "C" portion of the magnetic slope indicates that there is a change in the chemical composition of the basement rocks to the left of the San Andreas fault. There may be, however, considerable relief in the basement complex on this side of the fault. The former seems more plausible.

The outstanding condition shown by this magnetic profile is that the sedimentary section in this portion of the valley appears to be nonmagnetic, because there is no reflection of the surface topography in the magnetic curve. This is a condition diametrically opposed to that observed along profile No. 1. It seems rather surprising that this condition should develop in such a short distance from profile No. 1. Special note is made of the fact that the crest of the Caliente Range, which is an anticlinal structure, is located in a magnetic

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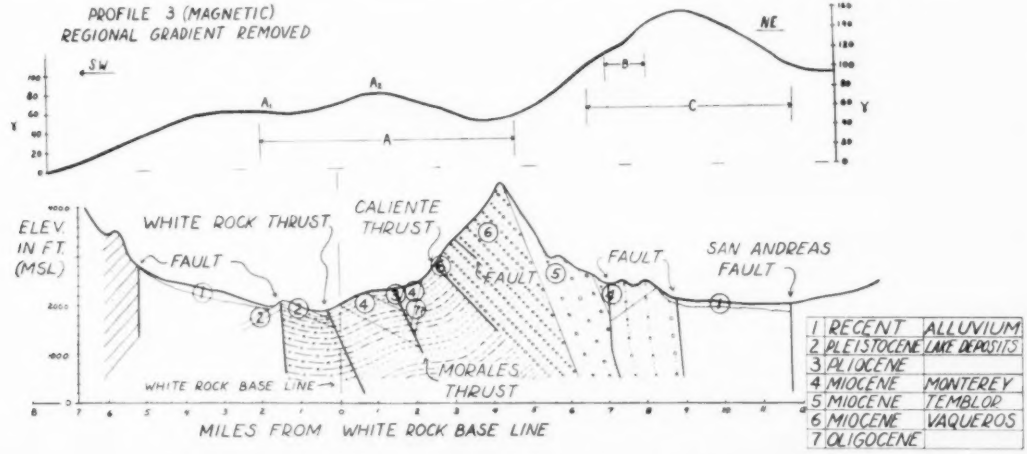
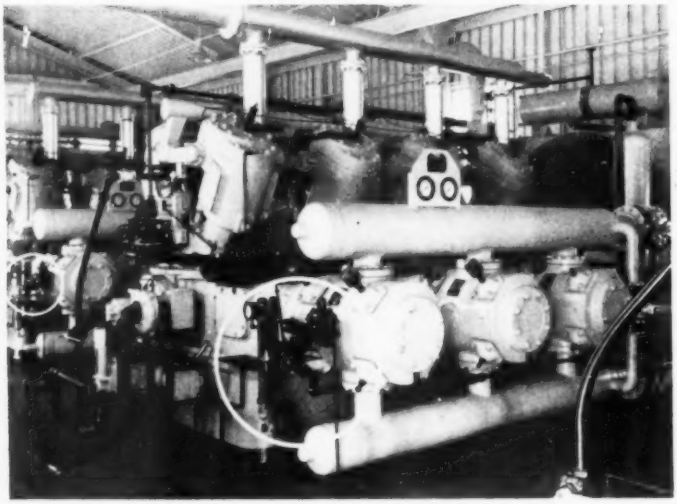


Fig. 5—Airborne magnetometer profile No. 3 (immediately north of Russell field)

Automatic Operation

. . at United's Dallas Compressor Station

by D. H. Stormont
District Editor



Above: United's compressor station at Dallas Junction which was installed to assure adequate delivery of gas to Fort Worth, 25 miles distant. Currently the intake and discharge lines are being modified so that gas will pass through the oil-type scrubber (right) whether or not it is run through the compressors

Left: Compression facilities consist of four "packaged" 300-hp. units which automatically cut in when the main-line pressure at the station drops to about 210 psi. Controls for accomplishing the automatic loading and unloading of two of the three compressor cylinders are shown alongside the front cylinder. The third cylinder operates fully loaded except when there is danger of an overload, then it is unloaded by a low-suction unloader

THROUGH use of automatic engine-speed controls and compressor loading and unloading equipment, completely automatic operation is being secured at United Gas Pipe Line Co.'s main-line booster station on the southwest edge of Dallas. The station, located on the company's main line from Mineola to Dallas and Fort Worth, consists of four 300-hp. "packaged" compressors and auxiliary facilities. Rated at 60,000,000 cu. ft. daily, maximum, the station's output is automatically controlled from zero to full capacity as demand in Fort Worth warrants.

Experience has shown that a main-line pressure of about 200 psi. at the Dallas station is sufficient to supply requirements at the Fort Worth terminus. Accordingly, during season of peak demand the engines operate almost continuously with the compressors automatically cutting in and out as needed to assure this discharge pressure.

Since bulk of the line's load in both Dallas and Fort Worth is industrial, with air-conditioning equipment playing an important role, peak-load conditions are encountered in summer months rather than in wintertime. In a day's operation, for the same reasons, the compressors are generally required to work from mid-morning until 10:00 or 11:00 p.m. During winter months only little duty is required of the station. The compressors are always immediately available, however, if they are needed for any reason such as a main-line break. Placed in operation in August of last year, the station gave a very creditable performance during the hot days of the past summer and early fall.

The four compressor units in the Dallas Junction station are Beaird packaged compressor plants. Each is a complete unit, with all necessary components built into it. These include the 300-hp. Ingersoll-Rand angle-type engine compressor; a Happy-Young cooling system for both jacket water and crankcase oil; lubricating system; manifolds for gas

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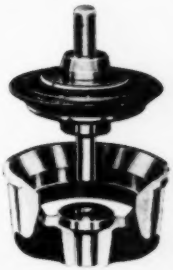

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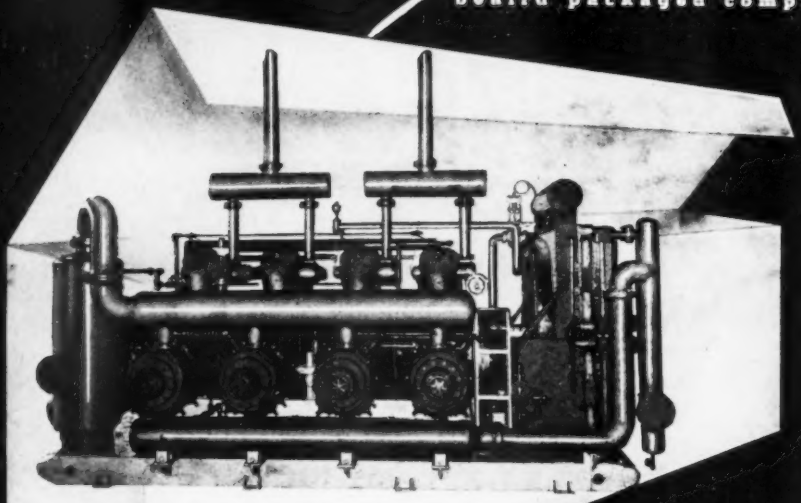

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intake, gas discharge, and exhaust; surge tanks for fuel gas and cooling water; and all necessary piping and controls. The three compressor cylinders are 9¼-in. bore by 12-in. stroke. Total rated capacity of the four units, at 150 psi. suction and 200 psi. discharge, is 2,500,000 cu. ft. per hour at an engine sped of 350 r.p.m.

Each compressor unit is mounted on a reinforced concrete and steel base, which required only a concrete slab for a foundation. The slabs were prepared before the units were received and included anchor bolts for fastening down the skids. After the plants were set, a concrete floor slab then was poured flush with the tops of the skid mounts. Because of the station's close proximity to Magnolia Petroleum Co.'s Dallas laboratories, where seismic and other delicate instruments are employed, special precautions were taken to reduce vibration. These included the use of cork pads in the foundation.

All engines are fitted with gas-operated automatic speed controls for limiting engine speeds between a minimum of 250 r.p.m. and a maximum of 350 r.p.m. To further protect the engines each is provided with a mercury low-pressure oil cutout switch, a high temperature water cutout switch, and an overspeed switch. Any of these will ground out the American Bosch magnetos used on the engines, automatically stopping them in the event of trouble.

The three compressor cylinders have two suction and two discharge valves on either end. On each engine the four suction valves in each of two cylinders are automatically loaded or unloaded by gas-operated, two-step unloaders. The two suction valves on one end of the third cylinder are unloaded only when the suction pressure drops too low and there is danger of overloading the engines. Unloading of this third cylinder is accomplished by a separate Climax low-suction unloader.

Operation of Compressors

During times of peak demand the main-line pressure at the Dallas station usually will have increased to around 300 psi. in the early morning. Since the booster station operates to maintain a pressure of only 200 p i., the engines will be running at a minimum speed of 250 r.p.m. and with two compressor cylinders completely unloaded—the unloaders will be holding the compressor suction valves off their seats on two cylinders of each compressor. As demand for gas in both Dallas and Fort Worth increases, the line pressure at the station drops but the compre.sor units continue to operate at minimum speed and remain unloaded until the pressure drops to about 210 psi.

When this line pressure is reached the engine-speed controls automatically operated to speed up the engines. Next the automatic unloader will operate to cause the suction valves on one compressor cylinder to close and the cylinder become loaded; then the second cylinder will load 3 to 5 psi. below the first. To prevent the engines from "bucking" one another it was necessary to stagger the loading and unloading of the individual engines. But by the time the main-line pressure has dropped to 202 psi. the cutting-in operation will be completed, and all engines will be operating at full speed and fully loaded.

The compressors will continue to operate until pressure in the discharge line has built up to 205 psi., at which point the lowest unloader functions to cut out one cylinder. If the line pressure continues to rise, the second-step unloaders will operate, holding the suction valves off their seats until the line pressure equalizes at 210 psi. All engines will slow down to the minimum speed of 250 r.p.m., and two compressor cylinders on each engine will be completely unloaded when a line pressure of 215 psi. is obtained. As indicated earlier, unloading of the third cylinder in each engine takes place only when the suction pres.ure becomes too low and the engines are in danger of being overloaded.

The pressure chart shown, made during last August, illustrates a typical day's operation. In the chart it will be noted that while the main-line pressure in Dallas declined to about 160 psi., the compressors held the pressure on the line to Fort Worth between 200 and 210 psi. during the peak-load period.

To protect the compressors, all incoming gas is passed through an oil-bath-type gas scrubber. Currently, incoming and discharge lines at the station are being modified so that, if desired, all gas passing through the line can be put through the filter whether or not it is run through the compressors. Fuel gas for the engines is taken directly from the main line.

A closed system is provided for the jacket-cooling water, with each unit having its own surge tank mounted on top of the fan-cooled radiator. To assist in maintaining the desired operating temperature on the engines and to hasten the warm-up period when starting up, a three-way Syphon valve was placed between the cool and hot water lines of each engine. By means of this valve all water from the engine and compressor cylinders can be circulated through the radiator, or it can be completely bypassed.

Makeup water, demineralized by passing through a Filt-R-Still, is stored in four underground storage tanks. Movement of water from the

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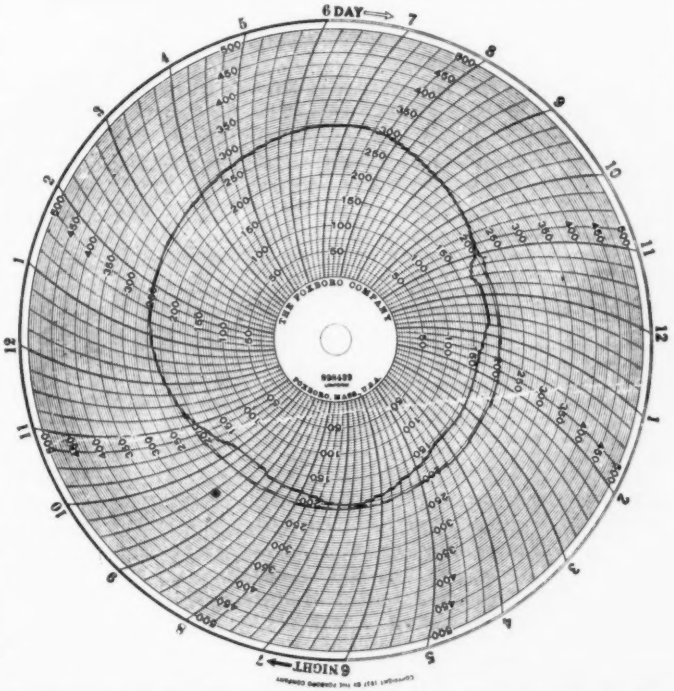
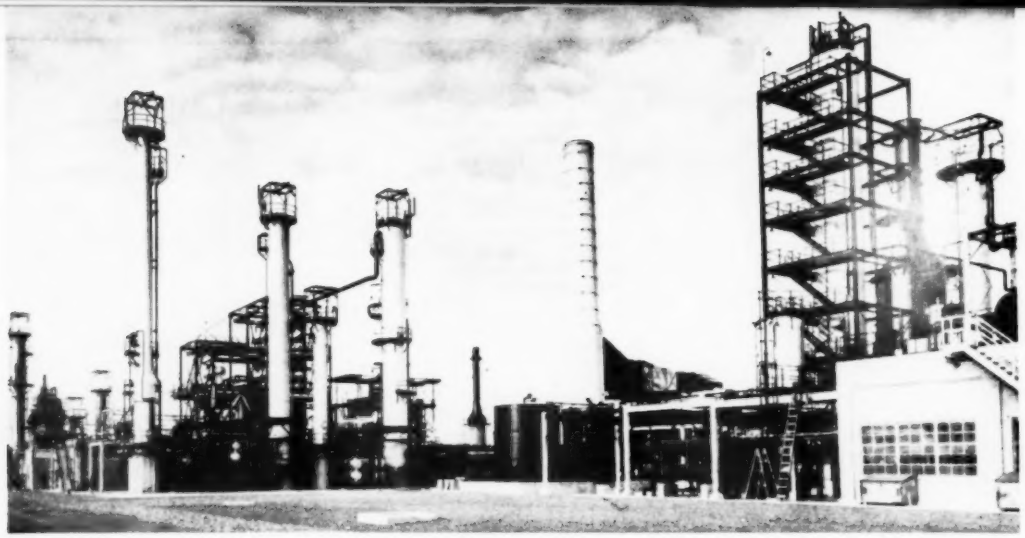


Pressure chart showing a typical day's operation. Note how the main-line pressure automatically was held just over 200 psi. throughout the peak-load period



A section of Texaco's new plant: left to right, the catalytic polymerization unit, thermal reformer, and furfural refining unit

TEXACO'S EAGLE POINT WORKS SOON TO GO ON STREAM

INITIAL estimates on The Texas Co.'s new Westville, N. J., refinery set the plant's cost at $40,000,000 but rising prices expanded the final bill to about $60,000,000, of which 95 per cent has been expended. Preparation of the 1,600-acre site on the Delaware River began in May 1947. The first major process unit was started up last month, and the complete refinery will be placed on stream early in 1950. The New Jersey plant, known as Eagle Point Works, is one important project in The Texas Co.'s widespread postwar expansion program which tends toward fewer but larger plants.

Although its design capacity is 40,000 bbl. daily, the new plant may be operated to process 50,000 bbl. of crude oil daily if the market demands it. Anticipated yields on the basis of crude charge approximate 55 per cent motor gasolines, 20 per cent middle distillates including furnace oils and diesel fuels, and 20 per cent residual fuels. This yield ratio is not fixed by plant design, as operating flexibility will allow adjustment of runs within relatively wide ranges.

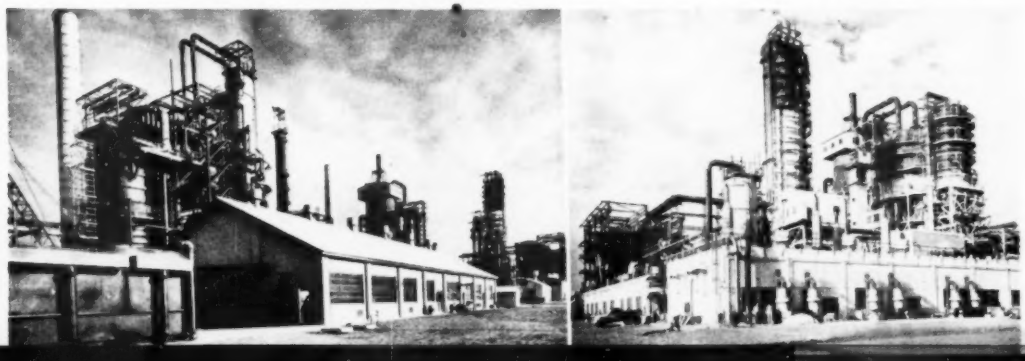
Advanced processes for fuel manufacture are incorporated in the new plant. Crude is now being charged to an atmospheric and vacuum unit with a 40,000-bbl. rated capacity. A catalytic cracking unit having a feed charge rating for 25,000 bbl. daily will convert the bulk of straightrun fractions to motor fuels and middle distillates. Thermal reforming will be carried on in a 10,000-bbl. daily unit. In addition to light-ends-recovery facilities the plant includes a catalytic polymerization unit. Furfural solvent refining will be used in processing middle distillates fractions of the sulfur crudes, for finished diesel and furnace oils. Gasoline components and furnace oils will be copper-chloride-oxygen treated.

Service facilities include a 275,000-lb. per hour steam-generating plant operating at 900-lb. and two 7,500-kw. electric turbogenerators. Office, warehouse, laboratory, cooling, storage, and shop facilities in the refinery are so designed and situated that they will either provide adequately for further expanded processing operations, or lend themselves to extension. In the processing area, space is available for five-fold expansion. In fact, initial installations provide for direct tiein of a parallel duplicate of the first 40,000-bbl. increment now on stream. No plans for further expansion have yet been announced, and expansion to 200,000 bbl. daily is a long-range possibility, dependent on future economics.

An interesting adjunct to refinery operations at Eagle Point will be the recovery of elemental sulfur from the sour crudes processed. This will be the first such operation in the East.

All crude for the new refinery will be brought in by tanker. Three docks are now completed; two will handle the largest tankers now in service and a third will serve barges for coastwise movement of products. Finished products will find outlets through the company's Philadelphia, Baltimore, and Bayonne distribution points, and Eagle Point works production is not expected to move as far as Boston for the time being. In addition to barge shipments, products will leave the plant by tank car and truck.

Left: The new atmospheric and vacuum distillation unit. Right: The catalytic cracker at Texaco's new Eagle Point Works



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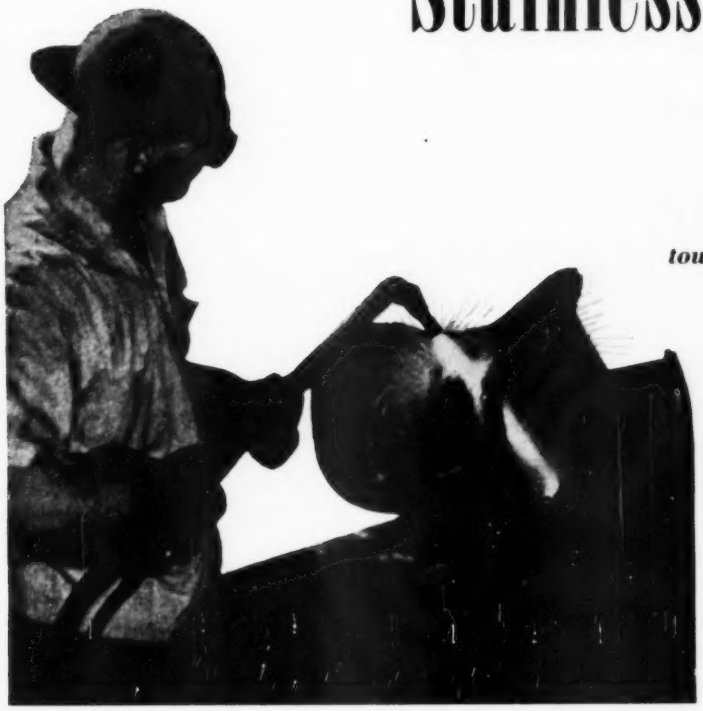

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By means of easily installed attachments for standard oxy-acetylene equipment, powder-cutting can be done without substantial change from carbon steel cutting techniques.

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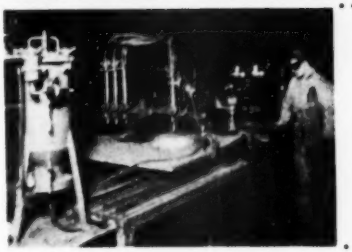
by powder-cutting, risers are removed 20 times faster than by older methods. Removal of riser pads and gouging out defects can be done at considerable savings in cost.

IN STEEL MILLS—

a 12,000-lb. ingot can be powder-scarfed in 4 to 6 hours—about 1/10 the time required for grinding. Sizing of ingots, billets, and slabs, removal of hot tops, scrapping operations, and many other cutting jobs can be done in a fraction of the time previously required.



IN FABRICATING PLANTS—

a stack of twelve 10-ga., type-304 stainless sheets were powder-cut at 8 in. per min. . . . 4-in. I.D. by 8-in. O.D. flanges on ½ in., type 316 plates were made in 2 minutes of cutting time apiece.

If you work with stainless steel you will want to know more about this LINDE process. LINDE can supply the equipment you need, help you to set up, and supply the training help you need.

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In Canada: DOMINION OXYGEN COMPANY, LIMITED, Toronto

Directional Drilling

Two interesting papers on methods and uses of directional drilling have been given at a meeting of the division of production, Pacific Coast district, A.P.I. To present this important subject the two have been combined into the accompanying summarization. The majority of the material is taken from a paper by D. L. Roberts, Long Beach Oil Development Co., with some additions and illustrations taken, as indicated, from a paper by F. A. Graser, Cleveland Oil Co.

THE unavailability or unsuitability of a surface site vertically above the desired bottom-hole location of a well is the most common reason for resorting to directional drilling.

The presence of immovable structures such as tank farms, compressor stations, reservoirs, bridges, docks, etc., prevents drilling from locations occupied by such structures. In many cases wells cannot be drilled from the area surrounding a structure because of noise and hazards inherent in oil-well drilling; or the presence of a rig may deny or restrict vehicular access to the area.

Drill sites located in residential districts of cities are usually difficult or impossible to obtain because of the existence of ordinances designed to reduce noise and prevent possible property damage.

Directional drilling can sometimes be employed to advantage when developing an oil zone under a low-angle fault or when the pool is bounded by two parallel faults. This becomes increasingly true as the width of the block and the dip of the fault decrease. A vertical well, for example, would have to intersect one or both faults, with a resultant loss of producing zone in one block, or take in portions of the producing zone in both blocks which in some cases has many disadvantages. On the other hand the well can be deflected so as to take advantage of the entire producing zone in one block. Furthermore, a controlled deflected hole can be employed when it is desired to open a greater surface of the oil zone to production. An application of this method would be in the development of an oil pool where oil is produced primarily by gravity drainage.

The drilling of a pressure relief well deliberately deflected into the bore of a well which is out of control for the purpose of diverting fluid flow is a well-known special use of directional drilling and has been very effective in some instances. Discussion of this application of the art is outside the scope of this paper, except as a test of surveying accuracy.

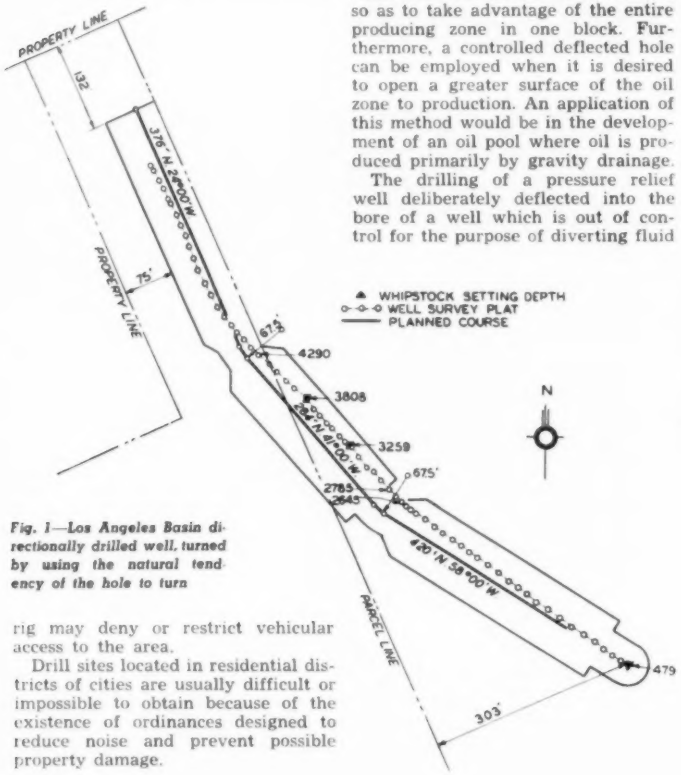


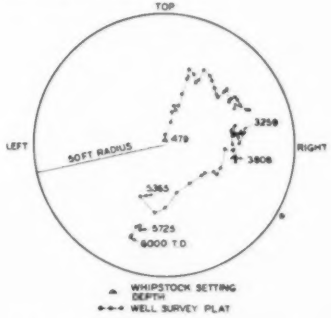
Fig. 1—Los Angeles Basin directionally drilled well, turned by using the natural tendency of the hole to turn

Techniques

All efforts to control the position ultimately to be occupied by any certain portion of the well bore may be classified as attempts to control (1) the angle and (2) the direction of the bore.

Primary control in a deflected hole is effected by the use of tools such as whipstocks, knuckle guides, etc. During the earlier history of deflected-hole drilling, tools were used as the main means of control. A review of histories of wells drilled only 13 years ago reveals that it was not unusual to employ as many as 18 whipstock sets in the drilling of one 4,200-ft. well. While usually effective, this dependence on the use of tools for even minor deflections has at least two undesirable results: excessive cost, and the introduction of unnecessary turns, or dog legs, in the hole. The presence of severe turns increases the chances of drill pipe keyseating and the sticking of casing strings. Wear on equipment is accelerated due to the extra round trips required. Maximum bit economy is seldom obtained because the person in charge always hesitates to run a used bit for fear of thus making necessary another round trip to renew it. This factor is, of course,

Fig. 2—Cross-section of the well illustrated in Fig. 1, taken at right angles to the well course at any point



aggravated by increased depth. Rod, tubing, and casing wear are increased by the presence of unnecessary dog legs when the well is placed on the pump.

As knowledge of the art of directional drilling was gained, it became apparent that complete dependence on deflection tool sets was unnecessary as certain manipulations of drill pipe and pumps, and selection of "setups," or drilling-tool assemblies could often be utilized to obtain the desired results. These techniques are now the major means of maintaining and changing the direction and angle of the hole.

Factors, other than tool sets, which are usually controllable may be listed as type of bit; size and length of drill collars; size, length, and position of drill-pipe singles used in "crackers," type and number of cutters on reamer; and position of reamer in string, weight carried on bit, rotational speed of bit, characteristics and circulating velocity of drilling fluid, and selection of depth, and therefore lithology of sediments, at which changes in well course are planned.

Two characteristics of drilling bits seem to have the greatest effect on maintaining or changing course. These are (1) the number and distribution of cutters, (2) the shape, size of tooth, and edge angle of the cutters. Edge angle is defined as the angle formed by the plane of the bottom of the bit with the teeth on the trimmer cutters.

Drill-Stem Characteristics

The entire tool string tends to (1) lie on the lower side and (2) roll up the right-hand size (as viewed from the surface) of the deflected hole. If no means of centering the bit is provided and normal weight is carried, it will tend to cut downward and to the right. Such action is increased by high hole angle, high rotational speed, soft formation, and high drilling-fluid velocity. The use of certain types of bits having only two cutters increases this tendency. Their action may be visualized as follows: as the bit is rotated the cutters pass through a position such that their axes lie more or less on a horizontal plane. In this position no cutting is being done on the bottom edge of the hole.

As the right-hand cutter is revolved to the bottom edge of the hole, much of the weight of the bit and string is carried on it, causing an acceleration in cutting action. This is accentuated by the fact that such bits usually are fitted with longer and coarser teeth than are used on bits having a greater number of peripheral, or trimming, rollers. The setup described above is the classic means utilized for obtaining either right turn or a decrease in angle, or both. As a matter of fact, when one is obtained, the other usually follows, at least to some extent. As a corollary, experienced directional drillers and supervisors often use the angle of the hole as an indication of its tendency to turn. If right turn is undesirable, every effort is made to maintain or increase angle.

One other set of factors (not usually regarded as controllable) which probably has a definite effect on the tendency of the hole to turn, is the compound angle at which the bit cuts into the top of lithologic units, and the character and relation to each other of such units. If the bit consistently impinges on the top of hard lithologic units which alternate with relatively soft units, at such an angle that the left side of the bit, for instance, always encounters the harder material first, either of the following may occur: (1) If a sharp, well-stabilized bit is being used, the hole will tend to drift to the left, since greater resistance to bit progress is met on the left side. This is true only if sufficient weight is being carried on the bit to cause continuous flexure of the drill stem, and that the stem is of such diameter as to permit flexure. After the bit has penetrated any one homogeneous stratum sufficiently far to bury itself, the effect is lost. However, it will recur at each interface of soft and hard formations, and is at times a valuable aid in obtaining desired directional characteristics. (2) The opposite effect will be in force, however, if the bit is dull and not well stabilized, and the angle of incidence is high. The bit will then tend to "slide" to the right into the softer formation.

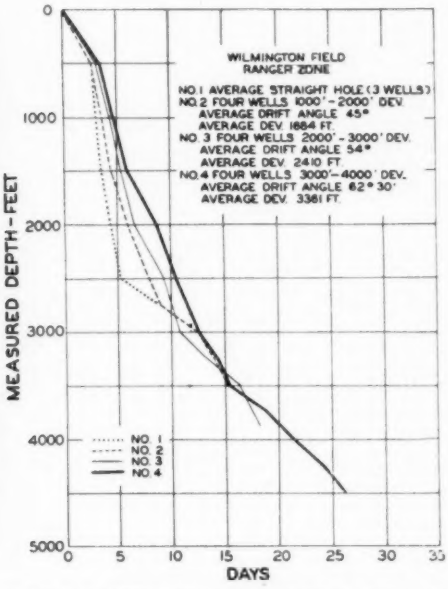

WILMINGTON FIELD
RANGER ZONE
NO. 1 AVERAGE STRAIGHT HOLE (3 WELLS)
NO. 2 FOUR WELLS 1000' - 2000' DEV.
AVERAGE DRIFT ANGLE 45°
AVERAGE DEV. 1684 FT.
NO. 3 FOUR WELLS 2000' - 3000' DEV.
AVERAGE DRIFT ANGLE 54°
AVERAGE DEV. 2410 FT.
NO. 4 FOUR WELLS 3000' - 4000' DEV.
AVERAGE DRIFT ANGLE 62° 30'
AVERAGE DEV. 3381 FT.
MEASURED DEPTH - FEET
DAYS
NO. 1
NO. 2
NO. 3
NO. 4

Fig. 3—(Left) Reamer, placed too low in the drilling string, tends to deflect the hole to the high side as shown. Weight above the reamer accentuates this effect (Graser). Fig. 4—(Right) Drilling-time rate curves for straight and directional holes. Except for time lost setting deflection tools, penetration rate for directional holes is at least equal to that for straight holes (Graser)

Normal Vertical Drilling†

In order to understand the elementary mechanics of directional drilling a well, we should first examine the requirements for drilling a vertical well. For a hard formation, it has been shown that the rate of penetration of the drilling bit is a function of weight of pressure exerted on the bit, speed of rotation, and volume of circulating fluid. For a certain size rig, there is a maximum limit to speed of rotation and the amount of circulation. The one factor most easily controlled from the "brake" is the weight exerted on the bit. When drilling in hard formations the driller in his anxiety to drill at a greater rate may add more weight.

During the normal course of drilling a part of the weight of the drill collar is applied to the bit and the drill pipe is in tension to the top of the drill collar. When this condition exists the weight of the drill collar tends to hold the drilling string straight as a plumb bob plumbs a string. A part of the weight of the plumb bob can be applied before the top tends to fall to one side. Similar-

†From paper by F. A. Graser, Cleveland Oil Co.

ly, if the weight on the bit is increased, the top of the drill collar falls to one side and rests against the side of the hole, and now the bit tends to drill off vertical. With large drill collars filling the hole quite full, this angle is not great and it might take several hundred feet of hole to become very noticeable.

With a further increase in weight where a part of the drill pipe load is applied to the drill collar, the problem can be considered as that of a column in loading. Thus, if the drill collar is considered as a column, it actually becomes bent because of the load exerted on it. Then the drill collar rests against the wall of the hole at a midpoint and angle is increased. It can be shown that the greater the load, the lower will be the point where the drill collar rests against the wall of the hole, the angle becomes greater, and the hole drifts faster from vertical.

West Coast Directional Drilling†

A number of wells in the Los Angeles Basin have been planned in such manner as to take advantage of the tendency of the hole to turn. An example is shown in Fig. 1. Since the only available surface site was that shown, the well course had to be designed to make at least one turn. The vertical angle of the hole is such that if the turn in the course were made all at one place, the dog leg would be excessive; therefore two turns were used. Three whipstocks were used, the first to effect the primary deflection, and the two subsequent to prevent the hole from turning too far to the right. Both turns were negotiated without difficulty by the use of bit control which utilized the tendency to turn, spoken of above.

A cross-section of the 100-ft.-diameter cylinder specified in the contract for drilling this well is also shown on Fig. 2. This section is plotted at right angles to the heavy course line at any point. The close control of the course can be seen from the fact that no point on the survey deviates farther than 35 ft. from the center of the section.

A study of the histories of 38 Long Beach Harbor wells, selected because of the relation of their courses to the dip of the structure, resulted in the conclusion that at least 21 of these exhibited a marked tendency to drift into the structure.

The strike of the structural flank lies on an average bearing of South 74° East. Five wells, the planned courses of which lay between South 07° East and South 78° East, required from one to four tool sets to effect southerly drift. Sixteen wells having planned courses of South 11° West to South 81° West also exhibited some tendency to drift to the north, requiring correctional tool sets.

The use of a reamer has an even greater effect on the drift angle of a bore hole than does the type of bit. Both the dressing and selection of position of the reamer in the tool string can materially affect results. Generally speaking, when increased angle is desired, the normal procedure is to place the reamer as close to the bit as possible and to decrease the sharpness of reamer roller teeth. Rotational speed is usually normal, a relatively high rate of drilling fluid velocity maintained, and the weight on the bit increased to above that normally used. This procedure results in a tendency of the drill pipe to force the top of the drill collar down and thus raise the bit, the reamer acting as a fulcrum. This effect, however, is lost if the reamer is placed too high in the string, and erratic results are often obtained when a bit-to-reamer spacing of about 8 ft. is exceeded.

Intentional Deflection*

There is an apparent relationship between the dip of the formations and the direction of the drift. There have been many cases in practice where a deliberate attempt has been made by use of the foregoing weight control to start a well off vertical for directional work. This would be in the case where the direction of the required drift approximated that of the natural drift. The use of the normal drilling tools without special reamers in directional drilling operations is limited because of the difficulty in holding direction and maintaining high angles of drift.

In the early days of directional drilling, a reamer was used above the bit for the purpose of holding the angle built up accidentally or by the aid of deflecting tools. Much to the surprise of the engineers and field men, they found that the drift angle increased with the weight applied to the bit. An analysis showed that the reamer acted as a fulcrum (see Fig. 3). Since the hole already had a drift angle, the unsupported section of the drill pipe tended to lie toward the low side of the hole because of the force of gravity. An increase in the weight on the bit tended to lower the point where the drill pipe or the drill collar rested against the well of the hole. The weight of the drill collars exerted a force in the direction of the arrow at DC. This force becomes greater as additional weight is applied. Reamer (R) acts as a fulcrum and an upward thrust is applied on the bit (B). This upward thrust causes the bit to cut more toward the top of the hole and at angle from the previous drift angle. Further examination of Fig. 3 will show that the application of weight can be varied greatly by the position of the reamer in relation to the distance between it and the bit, and by the amount of weight applied by the drill string. Also, it should be noted that the reamer should be at full gage at all times in order to get best results from its use.

Use of the "Cracker"*

In the case of wells in which a rate of angular increase greater than 3½° or 4° per 100 ft. of hole drilled is desired, however, some form of the "cracker" is often used. This assembly is composed of a bit with approximately 4 to 10 ft. of subs (or a short drill collar) above, followed by the reamer, a drill-pipe single, and another drill collar, often 18 to 30 ft. in length. The introduction of the drill-pipe single, of course, considerably increases the flexibility of the string, thus permitting an increased rate of angular buildup. However, the ability to increase lateral flexure is also increased, and some surprisingly large turns in direction (usually undesirable) can be obtained unless this method is used by skilled personnel and is closely checked. It is not normally employed for continuous drilling; the string is usually pulled after drilling the length of the cracker, and at least 50 ft. of hole drilled with a well-stabilized assembly. Thus the cracker, when rerun, is guided by the straighter portion of the hole and erraticism is reduced. Holes with a 7° per 100-ft. increase of angle have been drilled with such an assembly. No undue changes in direction were obtained in most cases; however, great care was exercised in checking the course of the well.

In certain instances a reduction in hole angle becomes desirable or imperative. This is usually obtained by the use of a tool assembly which is not too "stiff," i.e., smaller than normal drill collars, and a reduction in the length of the collars. A sharp bit, of a type having relatively coarse teeth with an acute edge angle is normally employed. The reamer is very seldom used, for reasons explained in the discussion of procedures used to increase angle.

Only the bending moment of that portion of the string below the point of zero tension is normally employed to force the bit downward; reduction in angle without excessive turn is therefore considerably more difficult to obtain than is increase. As a result, the usual practice in planning a "dropoff" is to lay out the well section on a ¾° to 1½° per 100 ft. of bore hole decrease in angle. This may be contrasted with a normal increase rate of 2½° to 4° per 100 ft. of hole.

It is the consensus of experienced directional drillers and supervisors

†From paper by D. L. Roberts, see introductory box.

*F. A. Graser (see reference cited).

*D. L. Roberts (see reference cited).

(Continued on page 78)

PROGRESS in METALS

by W. L. Nelson
Consulting Engineer

75 S—New Aluminum Alloy

ONE of the newest developments in aluminum alloys is 75 S alloy. It is intended to replace 14 S, 17 S, and 24 S, where its higher strength-to-weight ratio will permit appreciable savings in weight. If the parts require little or no forming, it can be substituted for 24 S without any difficulty. In the annealed state it has good machining qualities. Its corrosion resistance is good (equal or better than 24 S) and it is improved by heat treatment and aging. Production tools developed for 24 ST cannot be used for heat-treated and aged 75 S because of its high strength, low elongation, and poor shrink qualities.

Its composition is shown in Table 1. A substantial percentage of zinc is the major innovation in the analysis. Alloys 14 S, 17 S, and 24 S contain little zinc, and their major alloy elements are copper and magnesium (and some silicon in 14 S). Compositions of these and other alloys were published on the Progress in Metals page of December 28, 1946, page 272.

TABLE 1—PERCENTAGE COMPOSITION

Element—	75 S bare (or core)	Cladding
Zinc	5.1-6.1	0.75-1.25
Magnesium	2.1-2.9	0.1
Copper	1.2-2.0	0.1 max.
Chromium	0.15-0.40	
Manganese	0.1-0.3	0.1 max.
Iron	0.7 max.	
Silicon	0.5 max.	0.7
Titanium	0.2 max.	
Others	0.15	0.15
Aluminum	rest	rest

The mechanical properties are indicated in Table 2. The strength properties are quite remarkable, but the elongations are somewhat low. In comparison 17 ST has a yield strength of 40,000 and an elongation of 20 per cent, and 24 S has a yield strength of 45,000 and elongation of 20. Mechanical properties of other alloys were published on the Progress in Metals page of the November 30, 1946, issue.

The heat treatments are as follows:

Annealing—75 S-O—heat at 775° F. for 2 to 3 hours. If the material is to be stored for an extended time, it should be heated another 6 hours at 450° F.

Solution H treatment—75 S-W—heat at 870° F. and quench in cold water. Sheet can be heated to even 895° F.

Aged or precipitation hardened—75 S-T6—heat at 250° F. for 22-26 hours, and special two-stage treatments are also employed.

Cast Steels for Low-Temperature Service

CAST steels are finding wide use as components of industrial and military units that are subjected to high stress concentrations and low operating temperatures. Therefore, good toughness at low temperatures is required under these conditions. J. F. Wallace, in his paper, "Effect of Aluminum and Vanadium on Toughness of High Hardenability Cast Steels," presented at the annual meeting of the American Foundrymen's Society, May 2-5, 1949, points out that such engineering applications require a fine grained, fully hardened and tempered steel. The problem investigated and reported on in this paper is: What combination of alloys and what grain refiner will produce optimum toughness?

Of the three high-hardenability steels employed in this investigation, a medium manganese-nickel-molybdenum steel appeared to produce the best toughness, followed closely by a low manganese - chromium - nickel-molybdenum steel with a high manganese-chromium-molybdenum steel definitely undesirable for components requiring high toughness. A survey of the literature indicated that aluminum, titanium, vanadium, and zirconium could be used as effective grain refiners.

The results of this work show for the steels investigated that the aluminum-refined steels are more suitable for purposes requiring toughness than vanadium-refined steels. The literature contained some information that titanium was deleterious to high impact resistance. Little conclusive information was available on zirconium, however, and an investigation of the effect of this element should be considered for future work on this subject.

There are many other factors which influence the use of either aluminum or vanadium. These include the great availability, lower cost, and lower strain aging rates of aluminum steels compared to the strengthening effect, better welding properties, and superior high-temperature behavior of the vanadium steels.

An abstract taken from the August 1949 issue of Materials and Methods.

TABLE 2—MECHANICAL PROPERTIES (MINIMUM VALUES EXCEPT AS NOTED)

Material and condition—	Thickness (in.)	Tensile strength (max. psi.)	Yield strength at .25 per cent off set or at tension indicated: Psi.	Extension under load, in., in 2-in.	Elongation in 2 in. (per cent)
75 S bare:					
Annealed	0.012-0.5	40,000			10
	0.016-0.039	76,000	65,000	0.0166	7
Heat treated and aged	0.04 -0.5	77,000	66,000	0.0168	8
	1.0 -2.0	77,000	66,000	0.0168	4
75 S clad:					
Annealed	up to 0.5	36,000			10
	up to 0.039	70,000	60,000	0.016	7
Heat treated and aged	0.04-0.5	72,000	62,000	0.0164	8
	1.0 -2.0	77,000	66,000	0.0168	4

Is Cavitation a Corrosion Phenomenon?

THE November issue of Materials and Methods presents an abstract of a recent investigation by G. Petracchi (La Metallurgia Italiana) on the phenomenon of cavitation. He found that cavitation is initially destructive, not because of the mechanical stresses to which it gives rise, but because these stresses are associated with a corrosive action primarily due to electrical effects.

Corrosion due to cavitation, a phenomenon for which various theories have been proffered, occurs in marine propellers, hydraulic machines, condensers, etc. It is characterized by the liquid detaching from, then impinging upon the surface of the metal. This action is accompanied by formation of vacuum pockets in the liquid, liberation of gases normally dissolved in the liquid, and local corrosion of the metal.

In this phenomenon, the metal can operate as an anode and as a cathode. The electric currents are generated by microcells set up in adjacent crystals as a result of alternating mechanical stresses and the motion of the liquid.

Further investigations on this problem are being conducted.

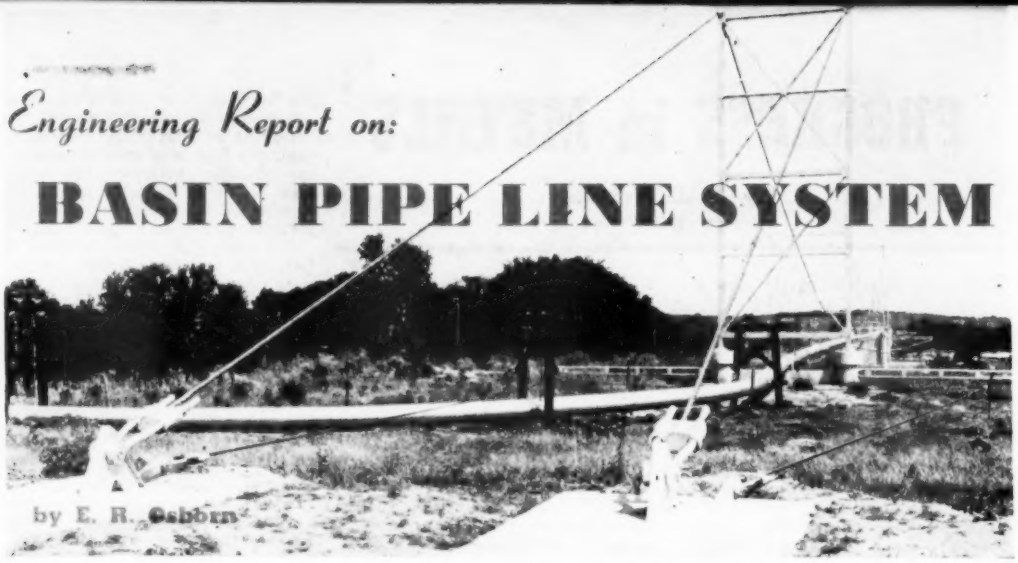
Forging Terms or Operations

EMBOSSING

A surface operation employing power or forging presses to force into relief a part of the metal surface. It is accomplished by forging or power presses.

Engineering Report on:

BASIN PIPE LINE SYSTEM



by E. R. Osborn*

Fig. 1—Here the 24-in. line section crosses the Red River from Texas into Oklahoma via its own 1,800-ft. bridge

PLANS for the construction of the Basin system to provide an additional pipe-line outlet from the Permian basin in West Texas and southeast New Mexico to the refining centers in the Mid-Continent area were undertaken early in 1947. Market demand had prompted a requirement for expansion of refining facilities and studies of crude-oil reserves to supply this development. The problem was one of supply, demand, and transportation.

These reserves, however, were at a great distance from the refineries in the Mid-Continent area, and the cost of building such a pipe-line system would be a highly expensive undertaking. Four common carriers by pipe line have met this challenge by undertaking the construction of such a project on an undivided-interest basis without government subsidies of any kind. The carriers are the Texas Pipe Line Co., Shell Pipe Line Corp., Sinclair Refining Co., and Cities Service Pipe Line Co. Together they have built a great new artery from the Permian basin to Cushing, Okla.

The system consists of 89.09 miles of 20-in. line from Jal, N. M., to Midland, Tex.; 252.36 miles of 22-in. line from Midland to Wichita Falls; and 174.83 miles of 24-in. line from Wichita Falls to Cushing.

*Assistant general manager, Texas Pipe Line Co.

This newest and highly modern trunk pipe line embraces a number of distinctive design features, including:

Flexibility of operation.—Pumping units permit line operation in six gradations of pressure and throughput.

Lower-speed pumps used. — And suction and discharge nozzles are placed on same vertical and horizontal lines.

Centralized console-type control desk.—Is installed in pressurized-control room.

Pump-room ventilation. — Through ducts via "penthouse" blowers.

Single lines.—At stations, installed above ground to each storage tank.

Two suspension bridges.—At river crossings, each consisting of three 600-ft. spans, suspended from steel towers.

The original Basin Pipe Line System project provided for construction of pumping stations at Jal, Wink, Midland, and Wichita Falls, having a line capacity of 144,000 bbl. per day to Wichita Falls and 167,000 bbl. per day to Cushing. Provision was made for the expansion of line capacity by the installation of additional intermediate stations, at Odessa, Colorado City, Haskell, and Lindsay, which would make possible a line capacity of 218,000 bbl. per day to Wichita Falls and 241,000 bbl. per day to Cushing. At this time the original stations are in operation and intermediate stations are being constructed. The full line capacity should be available before the first of the year.

Main Line Design and Construction

Viscosity of the crude oils transported in the system ranges from 40 to 90 S.U.S., with a weighted average of 70 S.U.S. and 0.859 specific gravity. Computations assumed a load factor of 95 per cent. The Heltzel

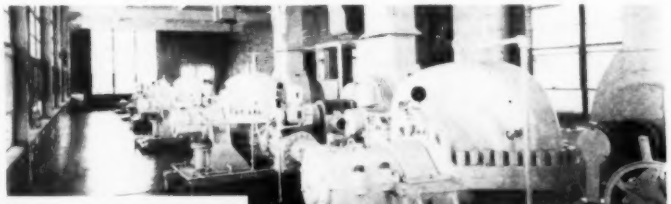


Fig. 2—(Right) View inside pump room at Wichita Falls station. Fig. 3—(Below) Stations such as this Wichita Falls installation are of compact, attractive appearance

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McKee designs complete refineries, individual units for all processes and auxiliary facilities including steam and power plants.

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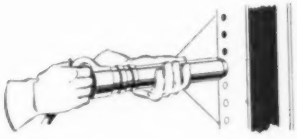
McKee buys all material and equipment, expedites procurement, makes necessary inspection and schedules arrival on the job at the proper time.



Construction and Installation

McKee field crews execute all stages of plant construction and installation of equipment from preparation of the site to completion of the project ready for operation.

McKee Experience

An inherent characteristic of all McKee services is *thoroughness*. This is a result of experience gained in repeatedly executing the multiplicity of details composing any large project. It is the factor that assures sound, practical design and engineering—prompt, economical procurement of materials and equipment—rapid, low-cost construction.

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30 Rockefeller Plaza, New York, N. Y.

formula was employed in calculating capacity and friction loss, although it was realized that the friction factors used were probably conservative for the given line size.

Grade X-46, A.P.I. Specification 5-LX, electric-weld line pipe was installed in the section from Jal to Midland, and Grade X-52 electric-weld line pipe was used in the section from Midland to Cushing. In general, wall thickness was determined on the basis of a safety factor of two on minimum yield strength. Design proposed operation of stations from Jal to Wichita Falls at a maximum pressure of 800 psi., and from Wichita Falls to Cushing at 850 psi. A minimum wall thickness of $\frac{7}{32}$ in. was established.

Construction specifications and performance followed trends developed in big-inch construction. Pipe was received in random 40-ft. lengths and was electric welded. Pipe coating consisted of an application of primer, coal-tar enamel, wrap of .025-in. glass-fiber mat, a second application of coal-tar enamel, and a finel wrap of 15-lb. asbestos felt. This specification applies to the 20 and 22-in. lines. On the 24-in. line the coating was reduced to one coat of enamel of equivalent thickness, with glass-fiber mat and asbestos-felt wraps.

With exception of several creek crossings in Oklahoma, ravine and creek crossings were laid underground. Minor crossings were simply treated with an extra coating of coal-tar enamel. Crossings of greater depth and hazard were constructed of 0.50 in. wall-thickness pipe with additional coal-tar wraps. The Red and South Canadian rivers were crossed with suspension bridges.

Valves on the main line are Series 600 cast steel, flanged, through-conduit type. These valves at station locations are motor operated; at river crossings and other locations where infrequent operation was required, they are manually operated. Scraper traps, valves, and stubs were installed at all proposed intermediate station locations.

Dual river crossings on the 22-in. line were constructed across the Colorado and Brazos rivers. The auxiliary crossings, constructed of heavy pipe with extra coating, in these instances were connected to the main line through 16-in. valve controlled stubs. The lines, however, were not placed in service but were filled with sweet crude and isolated from the main line until they should be required.

The Red and South Canadian rivers presented special problems of design and economics. At normal stage these streams appear to be minor problems, but experience indicates that at flood stage they are highly dangerous. From the standpoint of initial investment, assurance of future safety, freedom from excessive maintenance, and possible replacement, it was decided to cross these

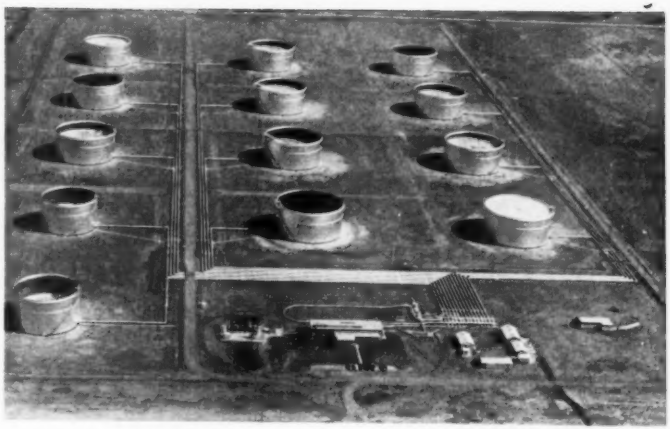


Fig. 4—Aerial view of Wichita Falls unit, with station in central foreground

streams on suspension bridges. The design (see Fig. 1) adopted in both cases consisted of three 600-ft. spans, suspended from steel towers on concrete piers. A minimum clearance of 15 ft. from maximum high-water level to bottom of pipe was adopted. Dead, live, ice, and impact loads were determined, netting a resultant panel load of 9,640 lb. or a load of 482 lb. per unit foot of bridge.

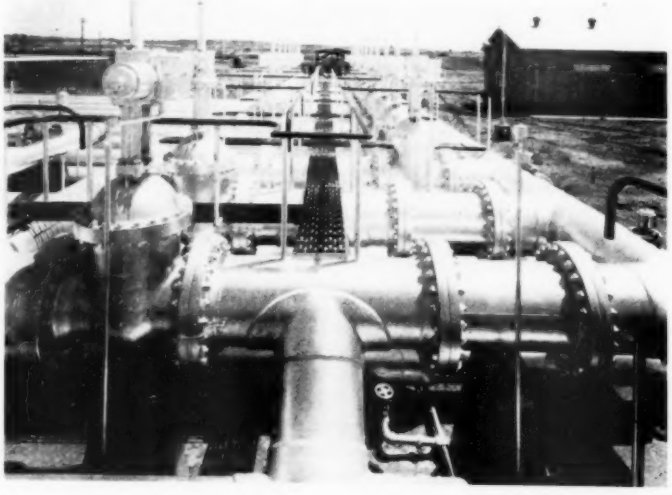
The towers, 50 ft. in height, were built with structural-steel members. Wind cables designed for wind velocities of 80 m.p.h. were supported on lateral wind arms at each pier. Connected concrete piers 42 ft. high and 24 ft. wide were supported on steel piling grills driven from 32 to 45 ft. in the river bed. Concrete main-cable anchors were constructed on each bank.

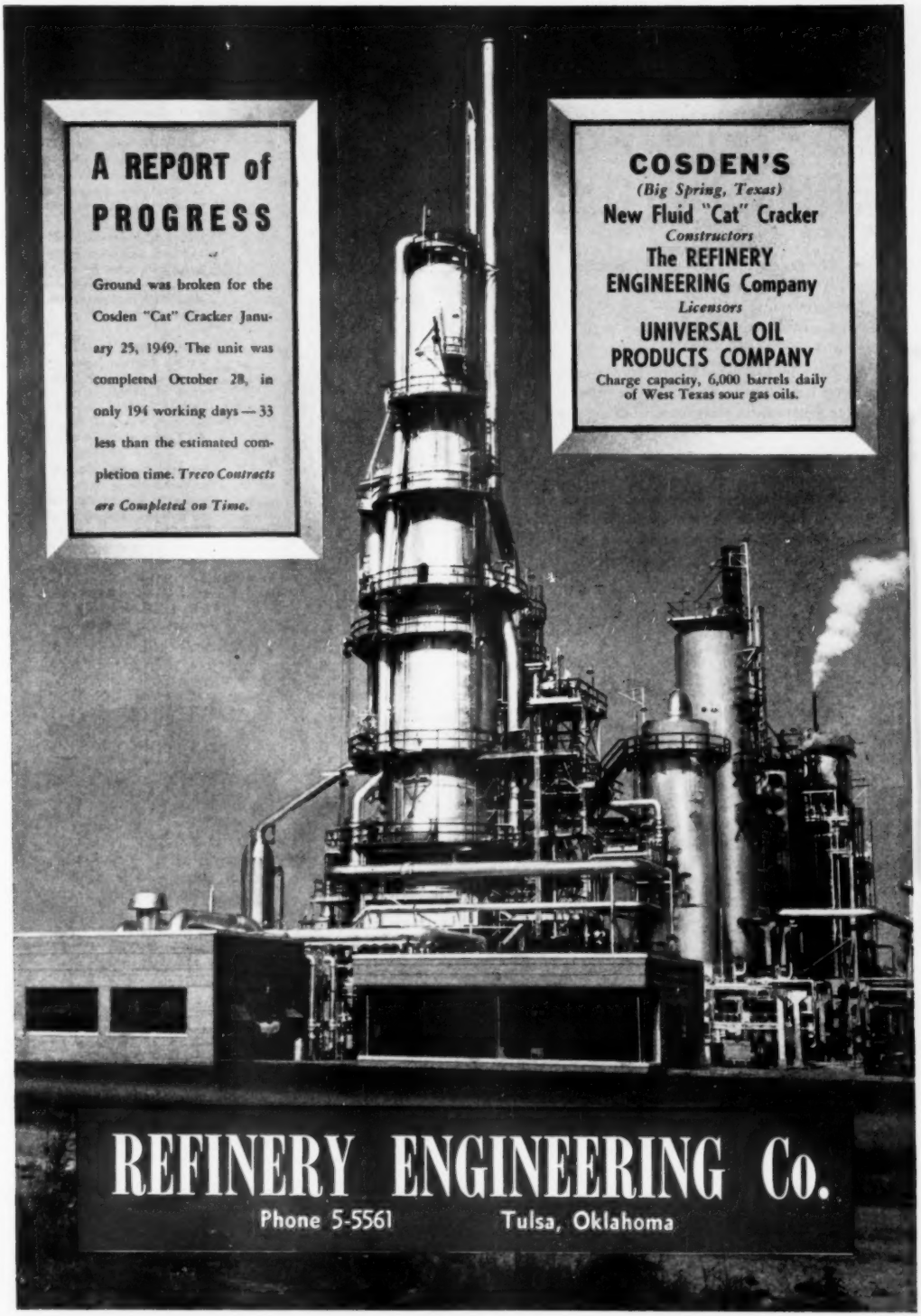
Stations

Since commercial power was not available for economical operation in the Jal area, two 639-hp. gas engines, connected through gears to two-stage 1,800-r.p.m. centrifugal pumps were installed at the Jal pump station. Two gas-engine-driven 187-kva. generators were installed to provide power for operation of booster pumps, motor-operated valves, and for station lighting. At all other stations commercial electric power was utilized.

Pumping equipment at each station consists of three full units of 1,250-hp., 4,160-volt, 3-phase 60-cycle, 1,780-r.p.m., 4-pole squirrel-cage induction-type motors, directly connected to 12-in. 2-stage centrifugal pumps, and one half-unit of 500-hp. motor, 1,780-r.p.m., driving a 2-stage

Fig. 5—Design and equipment features for one of the manifold installations

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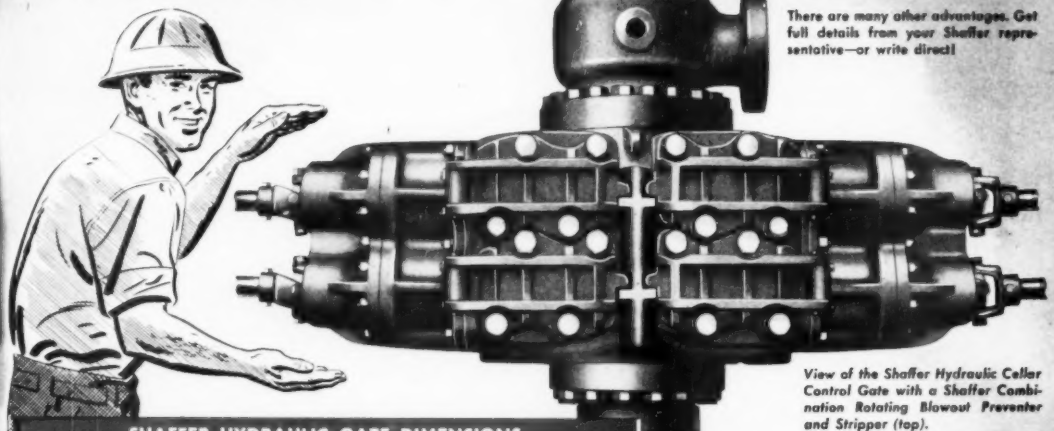

View of the Shaffer Hydraulic Cellar Control Gate with a Shaffer Combination Rotating Blowout Preventer and Stripper (top).

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Gate Size	7"		9"		10¾"		13⅝"	
Working Pressure (PSI)	3,000	5,000	3,000	5,000	3,000	5,000	3,000	5,000
Bore	7 1/16"		9"		11"		13 5/8"	
A—Height ...inches	25	26½	25¼	27½	27½	30½	30	36¼
B—Width ....inches	28⅝	31½	31⅝	35¼	34¼	37⅝	40	40½
C—Length ...inches	70¾	70¾	71	72	79	81¼	88½	88½

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And space-saving compactness—important as it is—is only one of *many* far-reaching advancements incorporated into the new Shaffer Hydraulic Cellar Control Gates. Some of the others are outlined at right, but space does not permit telling the *complete* story on this great new cellar control gate. So before you buy *any* control gate equipment, be sure to get ALL the facts about the new Shaffer Hydraulic Cellar Control Gate. It's the outstanding buy in the field!

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double-suction centrifugal pump. The units are piped so that they may be run individually or in any combination in series. In general the single units are capable of developing 120 psi. line pressure and the 2-stage units 240 psi., when operating on 70 S.U.S. viscosity and 0.859 specific-gravity crude. This installation permits line operation in six gradations of pressure and throughput and therefore provides maximum flexibility of operation.

The centrifugal pumps (Fig. 2) were designed with suction and discharge nozzles in the same vertical and horizontal lines, so that the pipe loads on the pump nozzles will not tend to rotate the casing. This design is expected to maintain alignment of pump and motor. From a hydraulic standpoint the 1,770-r.p.m. pump was selected since design considerations indicated that the pump would have a higher efficiency throughout the high-capacity range required than pumps of 3,560 r.p.m. The lower-speed unit also permits application of a mechanical seal in the stuffing box.

The pumps are equipped with spacer-type couplings so that mechanical seals may be removed without removing the top half of the pump or the rotating element from the pump case. These units are also equipped with thermal temperature controls in each bearing and in the pump case. Efficiency tests on the units ranged from 81 to 87 per cent, and the characteristics are such that high efficiencies are obtained throughout a wide range of operation.

Station buildings (see Fig. 3) are of contemporary functional industrial design. Structural-steel frames, on concrete, support face-brick exteriors with tile interior walls. The rear longitudinal wall in the pump room is entirely of glass, equipped with necessary ventilating sash. In plan, the building consists of a pump room, a control and equipment room, a small tool room, and a locker and toilet room. Access to the pump room is provided through exterior doors only. The control room and equipment room are isolated, and the area is air pressurized to eliminate the possibility of infusion of gas.

Above the roof a penthouse was constructed, containing louvered exterior, and an area for the location of blowers for cooling the motors and for pressurizing.

All main-line suction and discharge piping, including manifolds, scraper traps, and tank lines are aboveground. Details of this work, adjacent to the station, are not unusual, except in respect to the compact arrangement of the large piping and valves. The tank-farm piping, however, is a rather unusual development in pipe-line practice. (See Figs. 4 and 5.) At such locations as Jal, Midland, and Wichita Falls, where 122,600-bbl. floating-roof tanks were installed, a single line was laid to each tank, to serve for both receipt of crude and suction to pumps. The large volume of flow, the length of lines, and the necessity of providing positive suction heads on main pumps made necessary the installation of vertical-type centrifugal booster pumps on each line adjacent to the tank, equipped with a bypass and two-way check valve. This design permits crude to flow into the tankage bypassing the booster pumps. When flow is reversed, the check valve closes the bypass and the booster pump delivers the stream from tank to station.

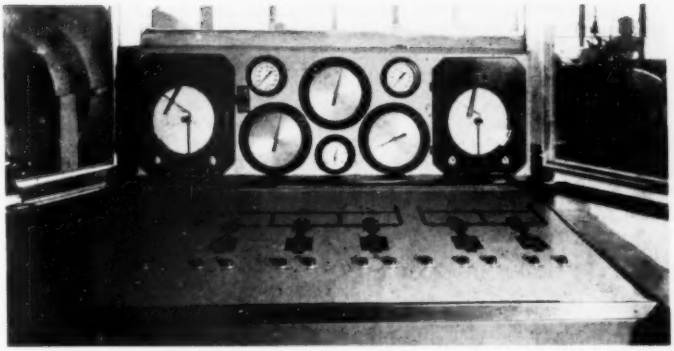
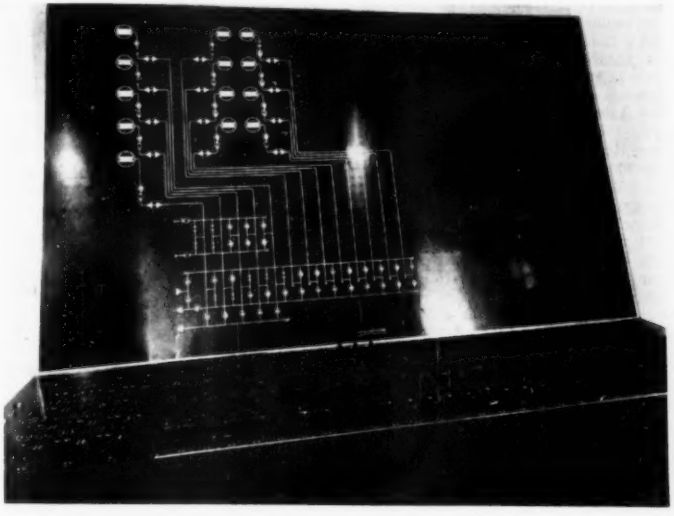


Fig. 6—Console-type control desk used at Basin pump stations

The long tank lines are installed with adequate provision for their expansion and contraction. The lines are anchored to concrete blocks adjacent to the manifolds. Anchor blocks are also constructed at each individual tank location, exterior to the booster-pump installation. Between these two points the lines are equipped with right-angle expansion bends at one or two locations. Pipes are mounted on roller supports, and at the bends or corners, the roller supports are modified to provide for angular movement of pipe. A small relief valve on each line controlled pressure resulting from expansion of the contained fluid. After completion, the exposed lines and valve installations were finish-painted aluminum. All valves are motor operated and controlled from the main pump station.

Tankage is provided to segregate receipt and batching of various grades of crude oil. The 122,600-bbl. tanks are equipped with pan-type or double-deck floating roofs. The usual wind girder is supplemented with a belt stiffener angle 18 ft. below top of shell. Because of their height and weight and necessity for maintenance of alignment, tanks were set on reinforced-concrete rings. The area within the rings is controlled compacted soil overlaid with sand. The underside tank bottoms received

Fig. 7—Tank farm flow chart and signaling equipment



a coating of asphalt. Interior bottoms and 2 ft. of shell were given two coats of plastic bottom cement.

Electrical System

The Jal station electrical system consists of gas-engine-driven generators (187-kva., 480-8,330 3-phase) and an overhead distribution system serving the adjacent tank farm. The system provides power for driving the booster-pump motors at each stock tank. Distribution transformers with 440-volt primaries, wye connected, and 220-volt secondaries are used for tank-farm lighting circuits and serve the motor-operated valves. This voltage circuit, which is not generally used, was chosen for the reason that with three-phase grounded circuits a higher potential than 440 volts is available for distribution purposes. Where 440-volt equipment such as transformers and motors may be wye connected and operated direct, there are, therefore, some savings in transmission losses without added expense of equipment with higher-voltage insulation. Secondary voltages of 120 208, three-phase, wye connected, are provided within the station building for lighting, valve motors, and other equipment.

In general the other stations contain like features to those at Jal, with the exception that stations where crude-oil storage tanks are located require remote control of booster pumps and valves.

Power for the all-electric stations, obtained from local utility companies, is delivered at 66-kv. and then stepped down to 4,160 volts at the power company's substation. Connections are made to the power company's overhead bus system to serve the pipe-line company's adjacent auxiliary substation. The latter installation consists of an outdoor, oil-immersed, 100,000-kva. interrupting capacity, main circuit breaker, and a bank of auxiliary transformers. At those stations where no tank farm is located, these auxiliary transformers consist of three single-phase $37\frac{1}{2}$-kva. units with 2,400-volt primaries wye connected and 120-volt secondaries wye connected to supply 120 208-volt, 4-wire auxiliary service. Where tank-farm distribution systems are required, these transformers are 75 kva., 2,400 240 120-volt, oil-immersed units with a 1,386-volt auto tap on each primary. The primaries are wye connected and fed from the 4,160-volt supply. With this arrangement, tank-farm distribution conductors are connected to the primary auto taps to produce 2,400-volt 3-phase service for the booster pumps. Tank-farm lighting and valve motors are served from this 2,400-volt system through distribution transformers. Secondary windings of the 75-kva. transformers are delta connected to provide 240 120-volt, 3-phase, 4-wire auxiliary service for the pump house and adjacent installations. Since these transformers are of a special type and therefore are not readily available for replacement in case of failure, a spare unit was obtained. The basic reason for specifying the type used was to eliminate the need for a second transformer bank to serve the tank-farm distributio nsystem.

An underground dual feed for the main power service is provided between the outdoor circuit breaker and the incoming line panel of the main switch gear. Each of the feeder circuits will carry the full load, so that a shutdown of the station is prevented in case of cable failure in either one of the two circuits.

Control of operations takes place at the console control desk located in the bay window of the pump-house control room. (See Fig. 6.) The desk top contains a flow diagram of the station pumping units. Indicator lights are provided to show the operating state of each unit, the oil flow, and the cause of certain faults which may develop within the pumping equipment. Start-stop push-button stations for each main unit are located on this desk also.

To start a unit, the operator pushes the appropriate start button and the following operations automatically occur in the sequence given and with the proper time intervals.

Sequence of Operations

1. Start motor-ventilating blower.
2. Open suction valve.
3. Start main pump motor.
4. Open discharge valve.

Pushing the stop button brings about the following operations in a similar manner:

1. Stop main motor.
2. Close suction valve.
3. Close discharge valve.
4. Stop ventilating blower for main motor.

Safety and protective devices are provided to operate in conjunction with the main circuit breaker, main switch gear, and console-desk equipment to perform the following functions:

1. Shut down individual unit in case of failure of respective ventilating fan supplying cooling for main unit motor.
2. Shut down unit in case either motor or pump bearing reach an unsafe temperature.
3. Shut down unit in case motor becomes overloaded.
4. Shut down unit in case the pump's case temperature becomes excessive.
5. Progressive shutdown of units in case station case pressure exceeds a predetermined normal value. This action is controlled by a pressure device connected to the station discharge system immediately upstream from the station-discharge pressure-regulator valve. When this particular device functions, the pump in operation nearest the station discharge side shuts down and after a predetermined time delay the next pump shuts down and the action continues progressively until the pressure returns to normal, or until all units are shut down.
6. Shut down unit if its respective discharge valve fails to fully open when starting, or if started, either the discharge or suction valve of the unit leaves the fully open position.
7. Shut down all units by opening their individual circuit breakers in case the station suction pressure drops to a predetermined value.
8. Shut down all units as in paragraph 7 above in case station discharge pressure reaches a predetermined value. This action is controlled by a pressure device connected to the outgoing line of the station at a point downstream from the station discharge pressure-regulator valve. This device is set to trip at a pressure somewhat lower than the station case pressure control.
9. Shut down station by tripping main outdoor circuit breaker in case of overcurrent.

An automatic reset-cutout type alarm system is provided to sound an alarm in case certain troubles develop. This device consists of a single howler or siren, which when it sounds may be locked out of the trouble circuit only by a single push button and automatically reset when the trouble is cleared. At the same time it is free to operate in case other trouble occurs. This alarm system operates for all nine protective features previously listed and in addition sounds an alarm for the following occurrences:

1. Excessive temperature of main motors as indicated by search coils in motor windings.
2. Low air-pressure supply which controls station discharge pressure-regulator valve.
3. High sump level.
4. Failure of control-room pressurizing blower.

The protective and alarm circuits are so arranged that the respective indicator lights will remain in service until the trouble is cleared, even after the alarm is silenced. All temperature-control devices, except search coils in motor windings, and all pressure-control devices are of the Bourdon-tube type which actuate the necessary number of mercury contacts required for the alarm and indicating equipment. Alarm and indication only for high sump level is used, while manual operation of the sump pump is provided in order to avoid contamination of sweet-crude batches with sour crude from the sump pit.

Secondary service is fed by underground cables from the auxiliary transformers in the substation to the unit control center located in the switch-gear room and the station-lighting panel. The unit control center contains all control equipment for auxiliaries not otherwise provided for by the main switch gear. At the stations which have tank farms it contains the necessary circuit breakers and reversing starters for the manifold-valve operators.

Underground feeder and control wiring serves the manifold-valve operators. Controls for tank-farm valve and booster-pump motors are installed on racks conveniently located within the tank farms.

In some cases, equipment in explosionproof housing was used, while in others oil-immersed controls were provided. At the booster stations, remote control and indication for scraper trap valves which have a bearing on station operation were provided on the console desk. These valves have local controls also, as

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well as the motor-operated valves of the scraper trap.

Remote control of manifold valves and tank-farm valves and booster pumps was effected by providing a flow chart and control desk within the control room of the pump house. (See Fig. 7.) This equipment consists of a vertical panel on which a diagram of the manifold, tanks, valves, pumps, and interconnecting piping is reproduced. Indicator lights are provided to show operating status of the booster pumps and the position of each valve. Red lights indicate a booster pump in operation and a valve in the open position. Green lights indicate a valve in the closed position. Both red and green lights burn when a valve is on intermediate position. Lighted flow arrows indicate the direction of oil movement within a given piping system.

Control stations for the various units are conveniently located and titled on the control desk attached to the lower portion of the flow chart. Each booster pump may be started or stopped with a push button. A three-position selector switch is provided for each valve, by which the desired operation of either closing, opening, or stopping the valve may be selected. The selector merely arranges the control circuits for a desired operation. The actual functioning of the valve motor does not begin until an operating push button is pressed. Once set in operation, the valve motor operates automatically until the valve is fully opened or closed. The stop position on the selector switch allows for stopping the valve operator in an intermediate position if desired.

Valve motors located within or nearby the pump house are controlled at 208 or 220 volts, depending on the secondary a.c. voltage available at the station concerned. For remote control of tank-farm equipment, d.c. at 48 volts is utilized. This current is supplied by an industrial-type, wet-cell battery which is automatically kept at full charge by a rectifier. This control system involved the use of telephone-type relays and control cables. Each d.c. control circuit is wired through a test jack located on the flow chart panel for use in locating trouble. Standard telephone cable is used for tank-farm controls. At some locations a surplus Navy-type communication cable, covered with basket weave, stainless-steel armor was used instead of the lead-covered standard telephone type.

The electrical grounding system at each station consists of a 4/0 bare copper-wire loop buried so that portions of the loop will lie beneath the building. All conduit and electrical equipment are then grounded to the loop by bare-copper conductors. Standard practice provides for connection of the loop to copper-clad steel ground rods. At several of the station sites however the usual ground rods, because of soil conditions, did not give adequate grounding, so 4-in. steel well casings were sunk to permanent moisture and connected to the loop. In order to further lower the contact resistance of the pipe, the backfill was treated with sodium hydroxide. Grounding of tank-farm equipment in such locations was accomplished by extending a ground wire from the station grounding network out into the tank farm.

Communications

The operation of this pipe-line system requires that reliable communications be established to all pump stations and working centers. A physical telephone circuit was built from Jal to Cushing, a three-channel carrier circuit was superimposed on the physical circuit between Midland and Wichita Falls, and a one-channel carrier circuit from Wichita Falls to Cushing. The physical circuit terminates at the Shell Pipe Line Corp. dispatcher's office at Cushing.

Connections are made from the communications system to the Texas Pipe Line Co.'s circuits at Wichita Falls and Texas-New Mexico Pipe Line Co.'s circuits at Midland, and Texas-Empire Pipe Line Co.'s circuits at Cushing. The line operations are dispatched by the Texas Pipe Line Co. from its Houston office. In the event of line difficulty the dispatchers at Houston may contact personnel of the Basin System through three separate circuits, one each to Midland, Wichita Falls, and Tulsa, thus permitting communication to this line from the center or from near its initial and terminal points.

Gas-Injection Calculations

(Continued from page 54)

the theoretical gas-oil-ratio relationships were computed.

When the calculated values of ρ_o were substituted in the cumulative recovery equation for a strict gas-drive reservoir, it was readily apparent that this reservoir was not behaving under strict gas drive as the calculated cumulative oil recovery was much less than the actual recovery. An alternative for explaining the higher recoveries was the conclusion that the reservoir was under gas drive with gravity segregation. Also by solving Equation 3 for h' (the fractional thickness of the reservoir occupied by gas cap) for the case of r = 0 (no gas returned to cap) using various values for ρ'_{oa} (residual-oil saturation in the drained gas cap) it was shown that the calculated gas-cap volume was much smaller than the measured volume during the later stages of the known reservoir life.

From this it was determined that some gas must have migrated updip to the gas cap from the oil zone to account for the increased size of the cap. This migration occurred after the initial stages of depletion. From the calculations and from field observations—i.e., gas migrating updip observed in structurally low wells, the trend of gas-oil ratio maps indicating paths of gas travel, the low producing gas oil ratios, and the abnormal size of the gas cap—it was determined that a large part of this reservoir was being produced under gas drive with gravity segregation with some gas migrating updip to the gas cap from the oil-producing section.

The fundamental gas-drive equations do not provide directly for gas migration from the oil zone to the gas cap. However, by using actual field measurement of the size of the gas cap at different intervals, it is possible to solve the equations for residual-oil saturations at any pressure interval. Another requirement in solving the equation is that the produced gas is derived solely from the oil zone. This requirement held true in the L_n reservoir as when the gas cap advanced to a well and its gas oil ratio began to increase, the well was closed in.

Since cumulative and ultimate recovery in this type of reservoir depend solely upon the oil saturation in the drained gas cap (ρ'_{oa}), this value was next determined. As obtained, it was in reality an effective residual-oil content of the oil column after the gas cap advanced through the producing section. This value is an average of transition-zone effects and indicates the degree of uniformity of the producing section. It is a measurement of past recovery efficiency of the reservoir and is dependent upon producing rates, efficiency of operations, spacing, etc.

To solve for an average residual oil content of the drained gas-cap area (ρ'_{oa}) of the reservoir, three different assumptions of ρ'_{oa} were substituted in Equation 4, using the previously calculated ρ_o values and the measured gas-cap volumes. Assumptions of ρ'_{oa} as equal to .40, .37, and .35 were solved and plotted with the actual measured production-pressure curve on Fig. 5. The calculated values of recovery, using the assumed ρ'_{oa} values, would be the ideal or maximum recovery for any pressure period.

The assumptions of ρ'_{oa} for .40 and .37 were discarded because the ideal recovery was either less or shortly would be less than the measured recovery. The value for ρ'_{oa} of .35 was decided to be the most representative of past reservoir performance and this value was used in remaining reservoir calculations. It is to be noted that the calculated oil production in Fig. 5 runs slightly higher than the observed.

This is what should be expected as the calculated values are independent of production limitations, such as time for recovery, spacing,

and producing efficiency. Also oil that is trapped against structure by lensing or shaling out in the sand body becomes lost and lower values of recovery are observed. Recommended gas injection in the gas cap should pick up some of this bypassed oil by providing a sweep action. Assuming future reservoir efficiency to approximate past history, the ultimate recovery (occurs when the gas cap has depressed to the bottom of the reservoir) was fixed at 50,900,000 bbl. after the value of p'_{oa} was determined.

Using residual oil in the drained gas cap as .35, measured gas-cap volumes and the p_a values as determined from Equation 1, the value of

$$r = \frac{\text{Amt. of gas returned to cap}}{\text{Total amt. of gas produced}}$$

was determined for each pressure interval by solving Equation 3. By multiplying the calculated oil produced (Equation 4) by the theoretical gas-oil ratio as obtained from Equation 2, the theoretical amount of gas which should have been produced during each pressure interval and the cumulative gas was obtained. By multiplying this value by its corresponding r value, the cumulative amount of gas which migrated updip to the gas cap was calculated at each pressure recording. From these values the differential amount of gas migrating during each pressure interval was obtained.

From this point, if it were assumed that the reservoir would continue to produce throughout most of its remaining productive life at an average rate of 250,000 bbl. per month and that gas migration to the gas cap in the future would be similar to calculated past migration rates, the curves depicting estimates of future pressure decline, gas-cap advancement and recovery estimations can be obtained assuming no gas injection or any artificial gas-injection program.

The curves shown in Fig. 6 were calculated for no artificial gas injection, and for daily gas-injection rates of 10,000 and 15,000 M.c.f. Actually, since October 1948, an active gas-injection program has been in progress. Initial injection rates into the gas cap were of an order of 10,000 M.c.f. per day. This rate was gradually increased to approximately 15,000 M.c.f. per day, which rate essentially replaces withdrawal volumes.

Conclusions

The L_1-sand "D"-segment reservoir of Oficina field is producing predominantly under gas drive-gravity segregation mechanics. Calculations indicate that 14,000,000 M.c.f. of gas had been added to the original gas cap by gas migration from the oil zone as of January 1, 1948. At that time the rate of addition of this gas was approximately 3,300 M.c.f. per day. The rate of this gas migration was closely dependent upon reservoir producing rates. The size of the gas cap is determined largely by the cumulative recovery rather than the amount of gas returned. The average residual-oil saturation in the oil column flushed by the advancing gas cap was 35 per cent of the pore volume.

Ultimate recovery without artificial gas injection might approach 48 million barrels of oil, or approximately 38 per cent of the total oil initially in place provided that the best production practices are followed and ample time is allowed for recovery of reserves. An artificial gas-injection program should moderately increase the ultimate recovery factor to a value approaching 40 per cent of the total oil in place.

In reservoirs producing by gas drive-gravity segregation mechanics, the final reservoir pressure will be dependent upon the amount of gas return. Gas-oil ratios on producing wells can be kept low provided that over-all producing rates are not excessive.

Advantages of artificial gas injection into a reservoir of this type are: (1) pressure maintenance will lessen the increase in oil viscosity and tend to maintain higher productivity factors thus enabling longer flowing life and lower lifting costs; (2) the length of time to recover remaining reserves will be considerably reduced; (3) the sweep action caused by the injection of large quantities of gas updip will moderately increase ultimate recovery by flushing oil that would otherwise have been bypassed; (4) finally, when the oil reserves are depleted, there will still remain a reservoir containing gas under pressure available for other purposes.

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Airborne Magnetometer Profiles . . .

(Continued from page 57)

minimum, and is, therefore, nonmagnetic.

Another outstanding magnetic condition is that none of the surface faults shown along the geological cross-section in the Cuyama Valley area are reflected. However, on the right-hand side, or to the northeast of the Caliente Range, in the Carrizo Plains area the surface faults appear to bear some relation to anomalous conditions, which suggests faulting in the basement.

Airborne Magnetometer Profile No. 3

On the map, profile No. 3 is shown as being approximately 2 miles to the northwest of profile No. 2. At the time this profile was flown it was just north of fast-developing Russell oil field.

It is worthy of note that profile No. 3 is magnetically different from profiles Nos. 2 and 1. Because of the variation between profiles Nos. 2 and 3, it is apparent that if an aeromagnetic survey in this area is to be reliable the profiles will need to be spaced rather closely, perhaps not more than ½ to ¾ mile, and certainly not more than 1 mile apart.

The various geological conditions which can be interpreted from this magnetic profile are as follows:

1. Two anomalous conditions exist in the "A" portion of the curve, with the stronger anomaly marked as "A_2".

2. There appears to be no graben indicated in this portion of the curve.

3. The "B" portion of the curve implies a possible basement fault of not too great a magnitude of throw that would be upthrust to the southwest.

4. The "C" portion of the curve as well as the "B" portion is quite similar to profile No. 2. The "C" portion of the curve is interpreted as either a change in the chemical composition of the basement rocks, or the result of a rather broad regional topographic high in the basement complex. Because of the size of this regional high it seems that the former interpretation is the more plausible.

Conclusions

Although considerably more geological conditions could be interpreted from the anomalous conditions indicated along the various profiles, it is believed that the most important anomalies have had attention called to them. It is the intention of the writer in presenting these profiles to point out how possible geological conditions are indicated by a few profiles. However, because of the limited amount of magnetic information, only generalizations can be drawn as follows:

1. It is suspected from certain fault indications on the profiles that very definitely basement faults exist, presumably regional, which are not reflected in any of the surface faults, either normal or overthrust.

2. An aerial magnetic survey in this general area with profile spacing of 1 mile should reflect, at least, the regional geology of the basement complex. However, greater detail would result if the profiles were spaced only ½ mile apart.

3. To get the most implied geological information from an aeromagnetic survey in this area it would be best to fly at least two levels. The profiles in the higher level should be flown in a northeast-southwest direction. The lower level should be flown at approximately right angles to the higher level and be divided into two parts, one part to be flown parallel to the strike of the Carizzo Plains

and the other parallel to Cuyama Valley proper. Such low-level flights would detect any secondary magnetic intensity that might arise from sedimentary conditions where structural deformation exists, as well as amplify any small and very sharp features in the basement complex.

Automatic Operation

(Continued from page 61)

storage tanks to the jacket-water cooling system is accomplished by applying air pressure on the tanks; whenever it is desired to drain the system, the pressure is bled off. Two of the underground tanks are used for storing water to which permanent-type antifreeze has been added.

An underground storage tank, and a similar use of air pressure, was provided for draining and refilling the compressor units with lubricating oil whenever the oil must be removed for any reason. New oil is kept in a nearby elevated storage tank.

Only two operators are required to run the compressor station and take care of servicing, cleanup, and other plant duties during their daylight tour. At least six operators, two per shift, would be required to run a conventional compressor station of equivalent size and capacity. While one or the other of the two operators is always available in cases of emergency, normally the compressors go on and off service without any human assistance whatever. To assure that the automatic controls will function properly in their absence, however, the operators daily check the unloading controls and automatic shutdown devices.

Acknowledgment

Appreciation is expressed to United Gas Pipe Line Co. for supplying the photographs and pressure chart shown on these pages.

Directional Drilling

(Continued from page 66)

that directional control of a bore hole having an angle of 3° to 6° from the vertical is much more difficult to maintain than when the angle is 7° or above. This may be clearly illustrated by examination of a few typical well surveys. Often the bore will exhibit marked deviations in direction from one section to another before 6° or 7° of angle have been obtained, after which the average deflected hole is well "lined out," and marked directional changes are rare unless accompanied by alterations of angle. Because of the low rate of angular change usually obtainable when decreasing angle, more hole must be drilled in the undesirable angle range (3° to 6°) than when increasing angle—a consideration when designing dropoff wells. However, at times this procedure must be used and many wells have been drilled in this way according to plan and without undue difficulty.

Whipstocks are usually set only from "flat" (concave face straight up) to a maximum of 140° rotation from the flat setting. To set a whipstock upside down, or nearly so, is always considered a dangerous procedure. The possibility of locking the bit because of the whipstock dropping down behind the bit or reamer militates against the use of this setting. As a result, experienced supervisors are reluctant to use whipstocks to drop angle, and dependence is usually placed on the force of gravity. Increased weight is also used at times to induce an increase in the rate of angle reduction, but directional control is easily lost as explained above.

BOOKS

OIL AND PETROLEUM YEAR BOOK, 1949. Published by Walter E. Skinner, 20 Copthall Avenue, London, E. C. 2, England. $4.

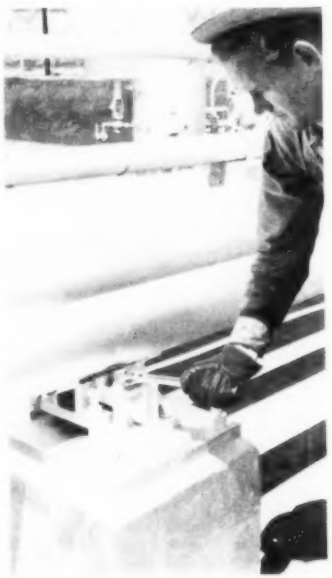
The 1949 edition, the fortieth year of issue of this standard reference work. Complete and up-to-date particulars are given concerning 733 companies operating in all parts of the world and covering all branches of the oil industry. American and foreign companies are fully dealt with. The particulars of each company comprise names of directors and other officials, description of business, where operating, crude-oil production, refinery runs, details of capital, dividends, and financial results.

Adjustable Pipe Support Has Many Uses

by Robert Harwick

WHEN construction plans were being made for Barnsdall Oil Co.'s Newhall-Potrero gasoline-repressure plant* near Newhall, Calif., it was found that where plant headers were to be connected to the old plant there was evidence of uneven settlement in the foundation. An adjustable support was required to prevent severe pipe strain from being introduced by this and possible future settlement.

Solution of this problem of vertical adjustment was achieved through the design of a completely adjustable support. The design proved readily adaptable to serve as a pipe guide either end to end, or side to side. The support can also serve as a pipe anchor, restraining movement in any chosen direction, or as a complete anchor allowing motion in no direction.



Here a plant attendant is adjusting one of the pipe supports to reduce pipe strain resulting from foundation settling

Pipe vibration can be dampened out by adjusting the pipe supports, either vertically or laterally along the line, to the proper tension to deaden pipe vibration.

The supports may be made by any good welder from readily obtainable materials such as plate, angle, bolts, set screws, etc. The section of the shoe which is welded to the pipe may be made from pipe sections to facilitate fitting the pipe contour.

The pipe support is made of $1\frac{1}{4}$-in. plate drilled and tapped for 1-in. foundation bolts. The base plate is grouted to the concrete support piers. There is no possible wear on the pipe. All movement is between the support surfaces.

In practice it has been found desirable to use lock washers on all cap screws; also, thin lock nuts on all set screws. This prevents loosening under operating conditions.

When using the support as a guide, it is advisable to insert wear shims. Shims may be made from 10 or 12-gage sheet metal cut into $1\frac{1}{2}$-in. squares and lubricated with graphite grease.

At the Newhall-Potrero plant the adjustable support is used on lines carrying from 300 to 2,500 psi. pressure. They are used on both suction and discharge service.

After nearly 4 years of use, the supports are considered entirely successful.

*For complete article on this plant, see The Oil and Gas Journal, December 1, 1949, page 73.

ENGINEERING fundamentals

Injection and Producing Wells

IN considering well behavior one ordinarily thinks of a producing well. Present technology often requires for many purposes the use of injection wells. Engineering calculations for such wells may appear to the neophyte to require new concepts or strange approaches. The purpose of this present discussion is to point out comparisons between injection and producing wells and to indicate concepts that are usable in both instances.

As pointed out previously (Engineering Fundamentals No. 391), a reservoir-well system must be considered as an entity, the wells being solely points of entry to and means of control of the reservoir. So far as the mechanism of reservoir flow is concerned, it is of no consequence whether fluid may be flowing into or from the well. Therefore, the engineering techniques which are applicable to producing wells ought also to be applicable to injection wells. Some of the variables which enter the analysis of producing-well behavior can be eliminated from an analysis of injection-well behavior because of the fluid and pressure control that are possible in the latter case.

One of the commonly used measures of performance on a producing well is the **productivity index.** The corresponding measure on the injection well has been termed **injectivity index.** Either can be defined as the rate of liquid transfer through the well in barrels per day per pound pressure drop between the flowing bottom-hole pressure and the formation pressure. The former index is

$$\text{P.I.} = \frac{Q_o}{P_r - P_{wf}} \qquad (1)$$

where Q_o is stock-tank-oil producing rate and the latter index is

$$\text{I.I.} = \frac{Q_w}{P_{wf} - P_r} \qquad (2)$$

where Q_w is rate of water injection. A few injectivity index curves are shown in the literature. Fig. 1 is typical. Of course, both productivity index and injectivity index can be defined for wells other than those producing oil or injecting water.

Another useful test on producing wells has been the bottom-hole-pressure buildup curve. This is observed by shutting in production and recording as a function of time the pressure readings opposite the producing formation. An analogous test for injection wells is the bottom-hole-pressure decline curve. During flow the injection well is a formation pressure source. When the injection stream is cut off the pressure opposite the formation in the well tends to fall to some equilibrium value. This pressure history can be recorded in the same manner as a pressure buildup. Fig. 2 shows a typical pressure-decline curve for a water-injection well. Information of this nature can be analyzed to yield the same type reservoir quantities as bottom-hole-pressure buildup data.

A method long used for analyzing the performance of producing wells employs the decline curve. In the case of a producing well the decline reflects the nature of the well system as well as the reservoir producing mechanism, fluid properties, and depletion conditions of the reservoir. In the case of an injection well the decline reflects the reservoir mechanism and the nature of the well system, but the other quantities are usually controlled. An injection well could under some circumstances increase rather than decline depending upon the control of the well. Fig. 3 shows a typical water-injection-well decline for a five-spot-pattern well.

The above analogies can be extended to include other behaviors. The individual factors which apply for producing wells will differ from those which apply to injection wells, but one can nevertheless apply the same general engineering techniques to both situations.

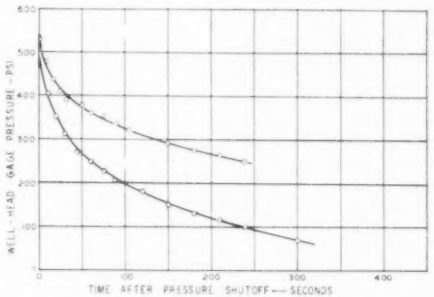


Fig. 2—Typical pressure-time decline curves upon shutting in water wells (Ref. 2)

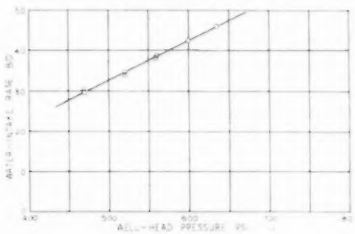
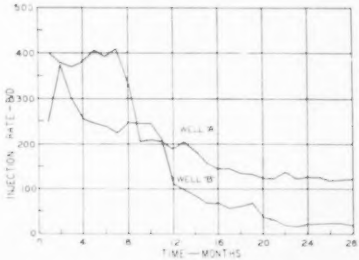


Fig. 1—(Left) Typical water-well injectivity index curve

Fig. 3—(Right) Typical injection rate-time decline curves for five-spot water wells (Ref. 3)



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Series by Dr. John C. Calhoun, Jr., Chairman, Petroleum Engineering School, University of Oklahoma

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Cost-imating

A WEEKLY FEATURE OF THE OIL AND GAS JOURNAL

Alphabetical Index

THIS article completes the Cost-imating Series. The costs can, however, be corrected to future dates by means of cost indexes that will be published each quarter (first issue of January—April—July—October) in The Oil and Gas Journal.

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Ventilator (23)	3-24-49
Vessels (3)	11- 4-48
(9, 10)	12-16, 23-48
Vessels, alloy, etc. (10)	12-23-48
Walkways (18, 28)	2-17; 4-28-49
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Water cooler (39)	7-14-49
Water treating (51)	10- 6-49
Windows (23)	3-24-49
X-ray inspection (10)	12-23-48

No. 63 in a series by W. L. Nelson, professor of petroleum refinery engineering, University of Tulsa

PERCO*

Octane Insurance

PERCO CATALYTIC DESULFURIZATION

IMPROVES

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- **BLENDING VALUE**
- **MARKETABILITY**

OF SOUR NATURAL GASOLINE

MEET today's market for high octane product. At a catalyst cost of only a fraction of a cent per barrel, a simple Perco Desulfurizer will remove 90 to 100 percent of the sulfur from sour natural gasoline. Desulfurized stocks gain up to 12.9 octane numbers at the 3 ml TEL level and maintain high lead response when blended with straight run or cracked gasolines.

The many installations prove the design, construction and operating features of Perco Catalytic Desulfurization. Operating cycles are long, eliminating the need for costly automatic control equipment. Yields are high with less than 0.5 percent volume loss customary between raw and finished storage.

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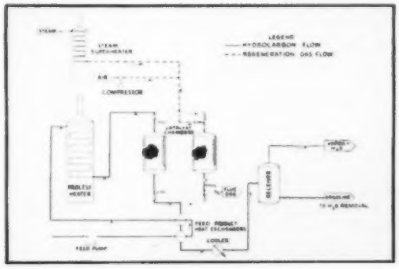
Our Perco engineering staff will gladly study your sour natural gasoline situation. We will suggest a Perco Octane Insurance Program to improve the sales appeal of your product both now and in the future—by using the Perco Catalytic Desulfurization Process.



Perco Catalytic Desulfurization Process

Phillips 66

PHILLIPS PETROLEUM COMPANY

PERCO DIVISION • CHEMICAL PRODUCTS DEPARTMENT

BARTLESVILLE, OKLAHOMA

PROFIT WITH PERCO PROCESSES

REFINING

Missouri Plant Turns First Coal Into Gasoline

A CONTINUOUS 7-week "break-in" run, converting coal-tar oil and Wyoming coal to gasoline and other liquid fuels, has been completed by the Coal Hydrogenation Demonstration Plant at Louisiana, Mo., Secretary of the Interior Oscar L. Chapman announced last week.

The operation is deemed of particular interest, the secretary said, because it is the first time that substantial quantities of oil have been made from tar oil and coal by hydrogenation in this country. The basic plant design proved to be sound and operable, he said. With minor changes and adjustments, the plant will be a useful tool in the development and study of the processes for the conversion of coal to liquid fuel, Chapman reported. It is contemplated that a wide variety of other coals will be tested later.

Chapman said it is also noteworthy that this complex new plant completed its first run without serious interruptions, although the operators had only the limited high-pressure experience obtained during a vapor-phase operation last April. The extensive use of automatic controls typical in American industrial practice already has resulted in a comparatively much smaller operating force than was customary in the commercial synthetic-fuels plants of Germany, he said.

Process Explained

The demonstration plant was designed to produce 200 to 300 bbl. of liquid fuels daily from coal in two high-pressure steps with pressure release and fractionation of the products between stages and at the end of the second step. In the first stage, called the liquid-phase hydrogenation, a paste of powdered coal and heavy oil is converted by the addition of hydrogen to mainly a synthetic crude oil. In the second step, or vapor-phase hydrogenation, this crude is hydrogenated further to produce high-grade synthetic gasoline and other fuel-oil fractions. The plant utilizes American-made equipment throughout.

The vapor-phase plant was operated last April to hydrogenate lignite coal-tar distillate to gasoline and diesel fuel. However, the current liquid-phase run was the first during which coal tar and coal-paste feed stocks were converted to synthetic oils. The operations were carried out at a pressure of 10,000 psi. and a temperature of 850° F., producing gasoline, naphtha, and vapor-phase charging stock.

After a thorough pressure-testing period, inert nitrogen and later hydrogen were circulated through the system to break-in moving machinery and test the instrumentation. The actual break-in operation started with the introduction of high-temperature coal tar oil on October 12. The charging stock and hydrogen first were circulated at full pressure and reduced temperatures, then the temperature was gradually raised to the reaction level. The tar-oil hydrogenation was conducted at 850° F., and after the available stock was used up, a paste containing 25 per cent Wyoming bituminous coal was introduced. The run continued in a satisfactory manner and was terminated with a planned shutdown on December 2.

General Petroleum Finishes New Bulk Loading Rack

General Petroleum Corp. has announced completion of a new $130,000 loading rack at its Harbor Island plant in Seattle. Designed to expedite bulk fuel loading into customers' delivery trucks, the rack can load six such tankers simultaneously.

The installation's fire-protection system is outstanding in that fusable heads of the automatic sprinkler system, when tripped, not only open a deluge valve direct from city water mains to all sprinkler heads, but also bleed off the air in the pressure system and shut off valves of gasoline and other product lines.

The entire rack area is depressed, with drains running into a 9,000-gal. underground sump. Should any inflammable products accidentally spill, they will immediately drain off into the sump, leaving the driveway area clear.

New Asphalt Plant to Be Built at Point Wells, Wash.

Stancal Asphalt & Bitumuls Co., subsidiary of Standard Oil Co. of California, plans to build an asphalt refinery at Point Wells, Wash., to meet the growing demand in the Northwest for asphalt products, the parent company announced.

Construction will begin as soon as design plans can be completed and contracts let. Completion is scheduled for mid-1950.

C. W. Stewart, Stancal's president,

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Send for a sample decal.
Perma-Flex Decal Co.
309 W. 8th Kansas City, Mo.

said the new facilities will include a modern vacuum-distillation unit, office building, insulated storage tanks, and complete truck and rail-loading facilities. Crude oil for the operation will be brought to Point Wells by tanker from California.

"The location of this new installation," Stewart said, "will permit us to give better and faster service to the Pacific Northwest, particularly the Seattle area. This construction is in line with our policy of keeping pace with the rapid development of the Northwest with locally operated production facilities. All grades of asphalt will be manufactured for road construction and maintenance."

Richmond Plant Employes Establish Safety Record

Refinery employes at Standard Oil Co. of California's Richmond plant have completed one of the best safety records in the history of American oil refining, on December 4, the company reported, when they registered 2,000,000 consecutive man-hours of work without a lost-time accident.

This record was accomplished over a 4-month period of around-the-clock operation by the plant's 3,600 workers. It makes Richmond the third refinery in the history of the industry to reach this safety mark, the company reported.

Canadian Firm to Process Crude From Alberta Soon

Canadian Oil Companies, Ltd., operating a 4,000-bbl. refinery at Petrolia, Ont., plans to process Alberta crude as soon as completion of the Interprovincial Pipe Line Co. line makes tanker deliveries to nearby Sarnia possible. The company currently runs Mid-Continent and Illinois crudes.

W. H. Rea, president of the company, announced in Toronto last week that Canadian Oil Companies has purchased $850,000 in debentures and 1,000 shares of common stock in the Interprovincial Pipe Line Co., giving them 5 per cent interest in each.

Sinclair Offers New Fluid

A starting fluid, designed to eliminate use of heaters and electric boosters required for starting diesel engines in cold weather, has been placed on the market by Sinclair Refining Co. It is offered in gelatin capsules and cans. Where the mechanism for priming diesels is mounted on the dashboard, the fluid in capsule form is more desirable, since it enables the operater to start without the aid of a second person for injecting priming fuel into the engine, the company said.

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in Cooling Towers, Compressors
Engine Jackets—Wherever Water is Used
Wright Chemicals are specifically formulated for individual applications in the Petroleum Industry to protect equipment from scale and corrosion.
There is a Wright Field Engineer near you who will be glad to help you with your water-conditioning problems. No obligation.
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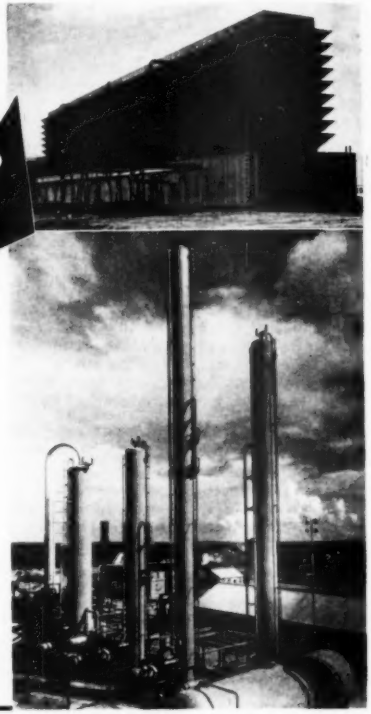


K-68

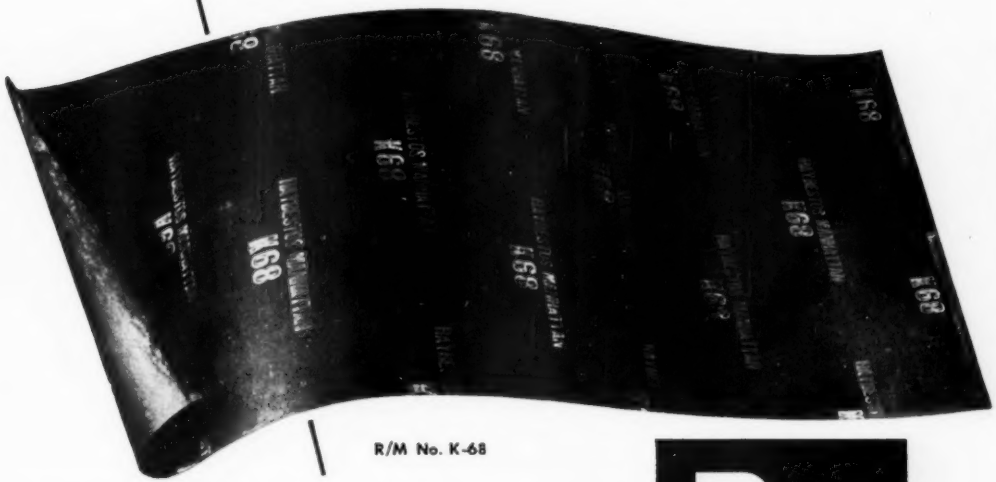
the sheet packing that resists hot oil

K-68 is recommended for gaskets on all kinds of equipment handling hot oils, gasolines, naphthas, and aromatic fractions. Because it is sulphur-free, this sheet is also recommended for use in refrigeration equipment.

K-68 was developed for use in aircraft and diesel engines and to resist the solvent action of aromatic oils at high temperatures. It complies with the difficult specification AMS-3232.

This exceptional packing is composed of specially selected Chrysotile asbestos fibres, bonded with Neoprene only, under great pressure.

K-68 is just one of the highly reliable R/M packings made for service in oil fields, pipe lines, and refineries. For information on the full R/M line, and for your free copy of the R/M catalog, call your oil field supplier or the authorized R/M distributor near you.



R/M No. K-68

RAYBESTOS-MANHATTAN INC.

PACKING DIVISION, MANHEIM, PA. | Factories: Bridgeport, Conn.; Manheim, Pa.; No. Charleston, S.C.; Passaic, N.J.

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LET IT SHOW YOU

Here's the way to get a true idea of the kind of job the Bethlehem Quenched Nut can do. Choose a high-temperature bolting job—as tough a one as you can find—and put the quenched nut to work.

The Bethlehem Quenched Nut has the internal strength, the stamina, the hardness, and the ductility to absorb all the punishment that high-temperature refinery bolting has to take. This is because it is truly a hot-forged nut. It is not merely punched from a hot bar, but is made by actually forging and extruding hot metal into a forming die. This results in a nut with a highly-refined, tough grain structure—a nut strong enough to break *any* stud or bolt on which it is used.

The Bethlehem Quenched Nut has uniform threads. Its oxidized sides are smooth, untrimmed, and resistant to corrosion. Made by Bethlehem's Lebanon, Pa., plant to ASTM Specification A-194, Grade 2H, it comes in all bolt sizes from ⅜ in. to 3½ in. It's ready to show you how good it is, any time you say.

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Bethlehem supplies every type of Fastening

Among the

Drilling Contractors

Number of Operating Rigs Declines From Year's Peak

A decline of 32 in the number of rotary rigs operating in the United States and western Canada was reported during the week ended December 19. Active rigs reported totaled 2,252 as compared with 2,284 rigs the previous week when the number was the highest at any time during the year. Decreases were general in all areas except Oklahoma, West Texas-New Mexico and western Canada. Active rigs by areas follow:

ROTARY RIGS IN OPERATION*

(United States and Western Canada)

Area	Week ended 12-19-49	Change week ended 12-12-49	Change week ended 12-20-48
Gulf Coast	531	— 8	—105
W. Tex.-N. M.	709	0	106
Ark.-N. La.-E. Tex.	160	— 1	— 19
Oklahoma	261	1	— 14
Kansas	136	8	— 19
Illinois-Eastern	141	— 9	— 3
Rocky Mountains	85	5	— 69
Pacific Coast	146	— 2	— 68
Total U. S.	2,169	32	—191
Western Canada	83	0	— 20
Total	2,252	32	—171

*Courtesy Hughes Tool Co.

Art Logan, Wewoka Okla., is the contractor on a new oil discovery well being completed for Mitchell and associates east of the Olive district, in Creek County, Oklahoma. The discovery well, 1 Beaver, 12-17n-8e, is producing from the Dutcher sand with casing perforated at 2,936-44 ft.

New Wyoming Field Puts Additional Rigs to Work

McCall Drilling Co. and Brinkerhoff Drilling Co. have moved rigs into the newly developed Glenrock field in Converse County, Wyoming. The former will drill for Steelco Drilling Co. at 1 Moore, in 34-34n-75w, 2 miles northwest of the discovery well. The latter will drill for Phillips Petroleum Co. at 1 Brubaker, in 33-34n-75w, ¼ mile east of the discovery well. Steelco Drilling Co., which discovered the field, will use its own tools on a third new test starting in the area, its 1 Robbins, 33-34n-75w, ½ mile east of its initial well. Productive horizon of the discovery well, so far the only producer, is the Muddy sand found at a depth of approximately 7,200 ft.

Dorris Ballew is the contractor for L. M. Lockhart on a wildcat test the latter is starting in Jefferson County, Mississippi. The test, 1 Lillie Hence, is located in 40-8n-1w, 2 miles north-

Members of the Safety Committee of the American Association of Oilwell Drilling Contractors in session at Dallas, set June 15 and 16 as the dates for the association's fourth annual safety clinic, and the place as Dallas. Members at the session were: Seated, left to right: Robert Dalgleish, Big Chief Drilling Co.; J. S. Bell, W. H. Black Drilling Co.; Harold L. Rowley, Big Chief Drilling, chairman; J. Doyle Settle, A.A.O.D.C., Dallas, secretary; John S. Jackson, Danciger Oil & Refining Co., vice chairman; Sam King, Kerr-McGee Oil Industries, Inc. Standing, left to right: Claude Pipes, Texas Employers Insurance Association; H. B. Zigler, Halliburton Oilwell Cementing Co.; Roy Dishman, Hunt Oil Co.; Fred Claiborne, Stanolind Oil & Gas Co.; C. W. Yancey, Rowan Drilling Co., Inc.; G. W. Hutcheson, George P. Livermore, Inc.; C. E. Louden, Employer's Mutual Insurance Co.; J. C. Anderson, Loffland Brothers Co.; W. W. Duncan, Loffland Brothers Co.; F. C. Cooper, Sohio Oil Co.

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WATER GAGE SET

For oil field, locomotive type and marine boilers. Water shows black — steam shows white; the water level is unmistakable. U-Bolt construction is strongest and simplest to service. Glass replaced by simply removing nuts on face of gage . . . unnecessary to work between gage and boiler. Conforms with A.S.M.E., Federal and State requirements when used for pressures specified by their respective codes.

This is one of the complete line of Penberthy gages that meet every liquid level gage requirement.

PENBERTHY INJECTOR CO.

DETROIT, MICH. Canadian Plant WINDSOR, ONTARIO

USE 'BESTOLIFE IT'S BETTER

'BESTOLIFE—the Lead Seal Joint Compound used successfully in the Drilling and Refining Industries for years—is immediately available through more than 100 distributors in the U.S.A. Your nearest supply house field store probably has 'BESTOLIFE in stock for immediate delivery. Use 'BESTOLIFE—It's BETTER!

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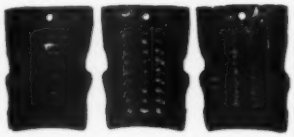
VARCO

CASING SPIDER — AND ELEVATOR SEGMENTS WITH 'VARCO' BUTTONS



"Varco" buttons, popular for years in rotary drill pipe slips, proved satisfactory and have been adopted and are installed in segments of automatic casing spiders and elevators of various makes. Wickers are removed and holes bored for a maximum number of VARCO casing buttons, to assure uniform and maximum gripping area. Converting buttons for the next smaller casings are available. Write for complete descriptive data.

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Whether you are working on mud lines, steam lines, water lines or oil and gas lines on your rig, RECTORSEAL #1 can make every connection leak-proof, safe and sure! 10 years of service and industry acceptance means it's got to be good!

It's easy to apply . . . a little goes a long way. It's dependable leak prevention for life of the connection.

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RECTOR WELL EQUIPMENT CO., INC.
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MAKING THE OIL INDUSTRY SAFER

west of Cannonsburg. Contract is for 7,000 ft.

Warren & Bradshaw Form New Operating Districts

Following the establishment of new divisional offices at Oklahoma City, announced last week, Warren & Bradshaw Drilling Co. and its affiliated production company, Coronado Oil Co. of Delaware, both of Tulsa, have set up three new joint districts, R. B. Warren, Jr., president, further announces. The new districts and their respective headquarters are: Oklahoma-Kansas, Norman, Okla.; West Texas- New Mexico, Midland, Tex.; and Panhandle, Borger, Tex.

As previously announced, L. L. Jones has been made general superintendent of all the districts with offices at Oklahoma City, with Don O. Freeman as executive assistant to the president with offices both at Oklahoma City and Tulsa. Warren will continue to have offices at Tulsa.

B & R Drilling Co., Wichita, has been awarded the contract for a wildcat test to be drilled for L. B. Stableford at 1 Harter, in 30-24s-13w, 4 miles southwest of St. John, Stafford County, Kansas.

Keyes, Marken & Grannell, contracting for The Texas Co., are moving a rotary rig to drill a south offset to the discovery well just completed by Northern Ordnance Co. on the Bowes structure, in Blaine County, Montana.

Smiley & Little Drilling Co., Oklahoma City, has started a 6,500-ft. exploratory test near McWillie, in Alfalfa County, Oklahoma, for H. M. Acre, Inc. Location is in 14-24n-11w, in the middle of a 5,000-acre block.

Charles Hulme Drilling Co., Great Bend, Kans., has a rig running for Anschultz Drilling Co. at 1 Allphine, 12-12s-13w, a wildcat location in the Drach area, northwestern Stafford County, Kansas.

Helmerich & Payne, Inc., Tulsa, has contracted for two more wells to be drilled for United Carbon Co. in the Elk City field, Beckham County, Oklahoma. These will be 1 G. Music, C NW SW 24-10n-21w, and 3 C. Walter, C NW NE, same section.

Murfin Drilling Co., Wichita, is moving a rig to southeastern Wabaunsee County, northwestern Kansas, where it will drill for Phillips Petroleum Co. at 1 McKnight, a wildcat in 16-14-12e.

Kerr-McGee Oil Industries, Inc., Oklahoma City, has the contract for Continental Oil Co. 1 Wenner, 4-8n-1e, a new operation in the Southeast Denver field, Cleveland County, Oklahoma. Contract is for 5,800 ft.

Falcon-Seaboard Drilling Co., Tulsa, has the contract for Toklan Production Co. 1-C State, a projected wildcat test in 16-17n-1e, Payne County, Oklahoma. Hole will be carried to the second Wilcox sand.

Robinson & Marshall, Shawnee, Okla., are moving in for a wildcat test to be drilled for Stonewall Oil & Gas Co. at 1 Bates & Chisholm, in 28-5n-7e, 10 miles northeast of Ada, Pontotoc County, Oklahoma.

L. C. Peters has the contract for latest well which Humble Oil & Refining Co. is starting in the Yantis field, Wood County, East Texas. The well, 1 Foster, is in the Joshua Groce Survey.

Ray Holbert is the contractor for R. J. Caraway and A. V. Erwin on a wildcat test being started in the G. B. King Survey, a mile southeast of Winnsboro, Wood County, East Texas.

Kerr-McGee Oil Industries, Inc., Oklahoma City, is starting a well for MacKinnie Oil & Drilling Co. in the new Lightning Creek field, Niobrara County, Wyoming. Location is for 1 Mulligan, in 12-34n-64w.

Try a string of Dragon Cups on your "tough" wells. Let your pumper judge their quality.

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GET THEM AT YOUR SUPPLY STORE

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Marietta, Ohio

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For the easiest brake known. It feeds off evenly. Standco never scores brake rims. See pages 3608-3613, Composite Catalog.

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TRANSIT ROTARY Pumps owe their unique success in many fields of service to Simplicity in Design, resulting in fewer wearing parts, easily renewed.

Bulletin 705 will be furnished gladly on request.

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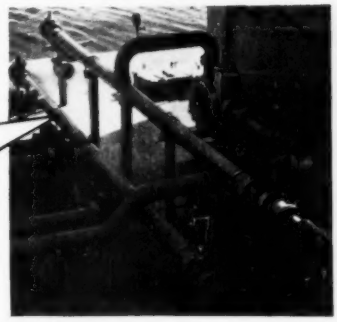

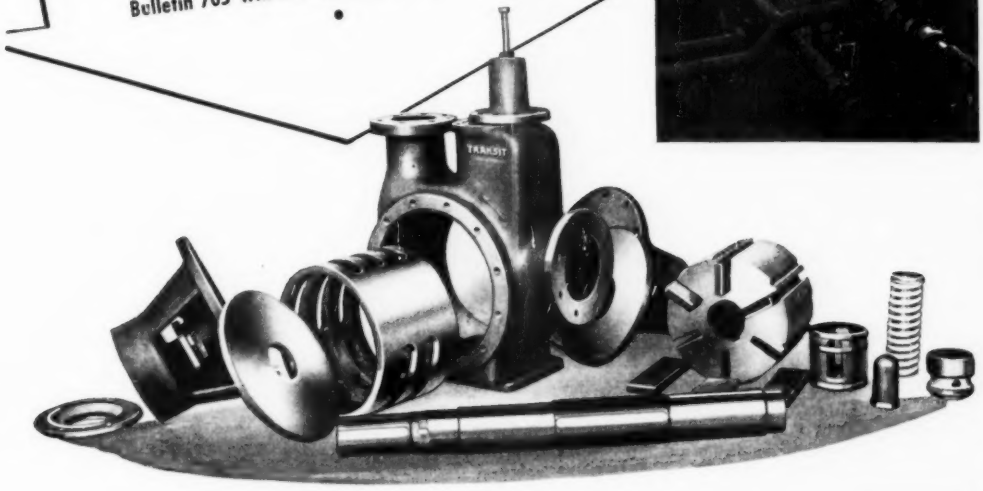

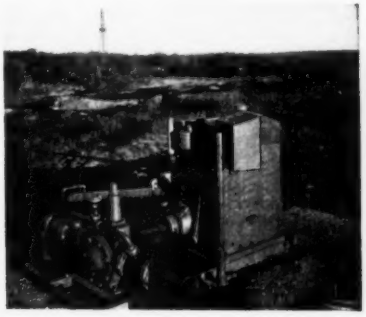

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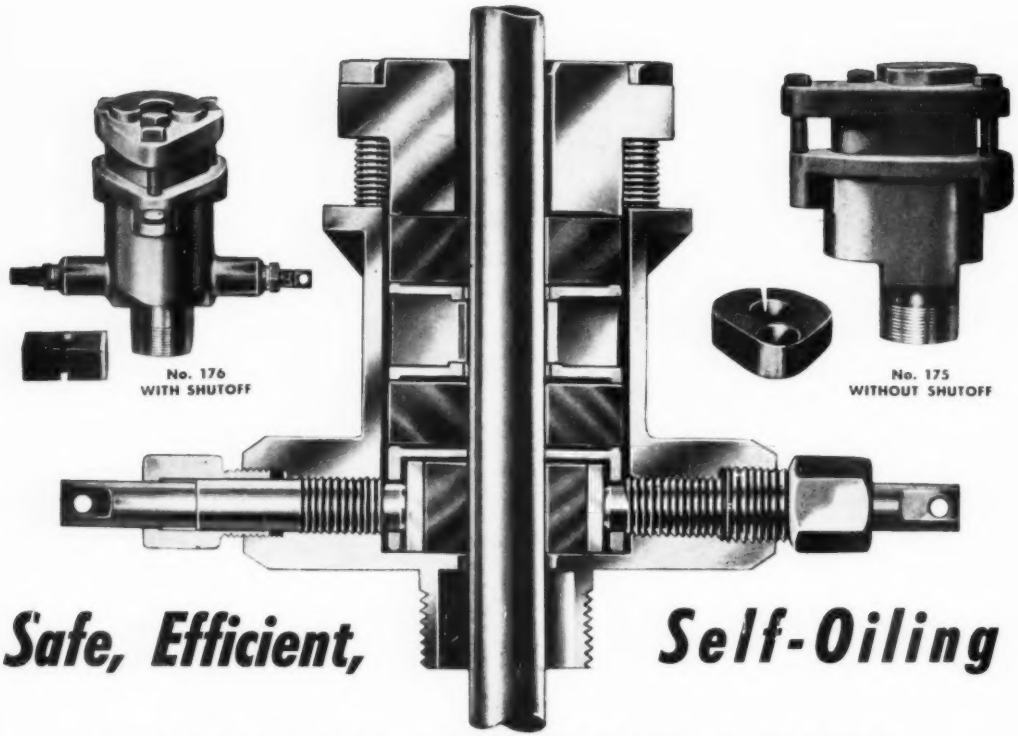

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RATIGAN STUFFING BOXES

The Ratigan No. 175 and 176 Stuffing Boxes are the only self-oiling units on the market today, receiving their lubrication directly from the pumping well.

They are excellent examples of modern design and sound engineering, and incorporate many advancements that greatly increase safety and efficiency in oil field service. Like all Ratigan Products, they are backed by many years of specialized oil field experience. They are made of high grade electric steel and tested to 3,000 pounds pressure. The inside of the box is removable, so that the device has two oil chambers. Another arrangement inside the body keeps these two chambers filled with fluid from the well, providing positive self-lubrication without depending on the human element.

Both types are identical in design and operation except that the No. 176 (sectional view above) has a special shutoff feature which makes it possible to shut off while repacking the box. This is accomplished by tightening the screws evenly in the shutoff, although care must be exercised, as the screws must be loosened again before the well starts to pump or the fluid will not get up into the stuffing box.

When the screws are not tight against the rubber, the stuffing box is free to function properly. For a further check on the fluid coming up through the bypass, the pumper may loosen the plug in the cap a little, and if the bypass is free the oil will flow immediately. If the oil does not come through, the screws in the shutoff are too tight.

The hole in the rubber is the size of the polished rod, while the hole in the metal parts of the body are larger, making the rod self-aligning . . . an important feature.

When repacking, both rubbers must be renewed. Instructions for installing are supplied to oil companies and supply stores on request, and are attached to all foreign shipments. When ordering, specify size and type of thread, and size of polished rod.

For more complete information on Ratigan Pumping Equipment, consult the latest edition of the Composite Catalog.

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RATIGAN PRODUCTS ARE SOLD THROUGH LEADING SUPPLY STORES

PIPE LINES

Two Spreads to Start at West End of Tapline

Construction will start in January at the western section of Trans-Arabian Pipe Line Co.'s 1,067-mile, 30-31-in. Abqaiq-Sidon project, according to Guy S. Connors, vice president, Williams Brothers Corp., who has just returned from a month's trip to the Middle East.

Last week G. E. (Doc) Burton and J. A. (Bill) Humphries, Sr., flew from New York to Lebanon to supervise the two spreads being organized under the direction of A. M. Garber, manager, and J. H. Burroughs, assistant manager, for Williams Brothers with headquarters at Beirut. The two spreads will work eastward in the section extending from the Sidon marine terminal site.

Each of the two spreads will have a field plant for denesting and triple-jointing 30 and 31-in. pipe to form 90-ft. sections. All welding for triple-jointing will be done by an automatic submerged-arc process which does not require running preliminary stringer beads by hand.

Lakehead Lets Contract For Superior, Wis., Dock

Lakehead Pipe Line Co., Inc., has awarded contract to R. C. Buck Co., Superior, Wis., for remodeling the dock at Superior, which is to be utilized for a marine terminal. Lakehead is to build in 1950 the 321-mile, 18-in. section from Neche, N. D., to Superior, in conjunction with Interprovincial Pipe Line Co.'s system to extend from Edmonton which will total 1,150 miles for sections in Canada and the United States.

Although the main line is scheduled for completion in the fall of 1950, the line will not be in full operation until the Great Lakes shipping season opens in the spring of 1951.

According to recent reports contracts have not been let for construction of Lakehead's pump station at Clearbook, Minn., or the terminal and tank farm at Superior. Headquarters for Interprovincial are at 10152, 101 Street, Edmonton, Alberta; for Lakehead they are at Superior National Bank Bldg., Superior, Wis.

Texas-Illinois Plans Laterals for Project

Texas-Illinois Natural Gas Pipeline Co. plans a 58-mile, 20-in. lateral to extend from the Joliet terminal of its proposed system to a connection with Natural Gas Pipeline Co. of America near Volo, Ill. Another lateral has been planned to extend from the Little Rock, Ark., area to be built with 26-in. to connect with the proposed system of Piedmont Natural Gas Corp. near Greenville, Tenn.

According to the Texas-Illinois application to Federal Power Commission, construction of its 1,254-mile main line of 30 and 26-in. from the Texas Gulf Coast to the Joliet, Ill., area will start in October 1950 for completion scheduled by November 15, 1951.

Gathering-System Firm Organized in Alberta

Alberta Interfield Gas Lines, Ltd., is reported to have been recently organized to build a pipe-line system which would act as a common purchaser and a common carrier for transmitting natural gas from Alberta fields to trunk-line facilities which would be operated to export from the province. Alberta Natural Gas Grid, Ltd., was previously organized for a similar purpose.

The Alberta Interfield firm has been formed by Canadians with an initial capital stock of $10,000,000. Directors are: H. R. Milner, Edmonton; Fred Staples, Calgary; E. R. McFarland, Lethbridge; Roy Marler, Brenner. The principal underwriters are reported to be Nesbit, Thomson & Co., Wood, Gundy & Co., both of Montreal, and Stone & Webster, Inc., Boston.

It is expected that Alberta Interfield will connect with proposed systems of Westcoast Transmission Co. (Pacific Petroleum, Ltd., Calgary) and Western Prairie Gas Co. (Osler, Hammond & Nanton, Winnipeg). Westcoast plans to lay a line via Yellowhead Pass to the states of Washington and Oregon. Western Prairie has proposed to transmit Alberta gas to Saskatchewan and Manitoba.

Colorado Interstate Laid 110 Miles for Expansion

Colorado Interstate Gas Co. laid 110 miles of pipe lines in its 1949 expansion program. Of this amount 91.8 miles were laid by contractors and 18.2 miles by company crews.

The work was done for eight projects with pipe diameters of 4, 8, 16, and 20-in. Half of the mileage was

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laid in Colorado and the other half in Kansas in the Hugoton field.

Regie Autonome Operates Toulouse-Bordeaux Line

Regie Autonome des Petroles completed a 114-mile, 8-in. natural-gas line early this year from Toulouse to Bordeaux, France.

Regie Autonome des Petroles has headquarters at 27 Rue de la Republique, St. Gaudens (Hte. Garonne) France. It operates under Direction des Carburants, Ministerie de la Production Industrielle.

Texas Gas Transmission Co. Puts New System in Service

The country's newest long-distance pipe line went into operation last week as Louisville Gas & Electric Co. received the first delivery of natural gas from southwest gas fields through the new 26-in. line of Texas Gas Transmission Corp.

The new transmission line, built in less than 8 months, will have an initial capacity of 304,000,000 cu. ft. a day when completed to Middletown, Ohio, next month. This will be increased in 1950 to 400,000,000 cu. ft. a day.

Deliveries will start this month to other utilities along the line, and to Texas Eastern Transmission Corp. next month for transmittal to subsidiaries of the Columbia Gas System, Consolidated Natural Gas Corp., and to other northeastern utilities.

The Texas Gas Transmission line was built at an approximate cost of $73,000,000 to transmit natural gas to Tennessee, Kentucky, Illinois, Mississippi, Louisiana, and Arkansas.

Louisville Gas & Electric received its first gas from southwest fields as part of a contract under which it receives up to 20,000,000 cu. ft. a day during the first year of Texas Gas Transmission line's operation; it will get 30,000,000 a day during the second year, and 40,000,000 cu. ft. daily thereafter.

Existing utility customers of Texas Gas Transmission will receive approximately 120,000,000 cu. ft. a day more than their present supplies. These customers include the Light, Gas & Water Division of the City of Memphis; Mississippi Power & Light Co., West Tenneessee Gas Co., Southern Indiana Gas & Electric Co., Western Kentucky Gas Co., and Indiana Gas & Water Co.

New customers of Texas Gas Transmission who will receive natural gas for the first time when connections are completed to their systems from the new line include Kentucky Utilities Co. (Paducah, Ky.), Tennessee Gas Co., Corporation of Dyersburg, and Madison Utilities Corp.

(Continued on page 99)

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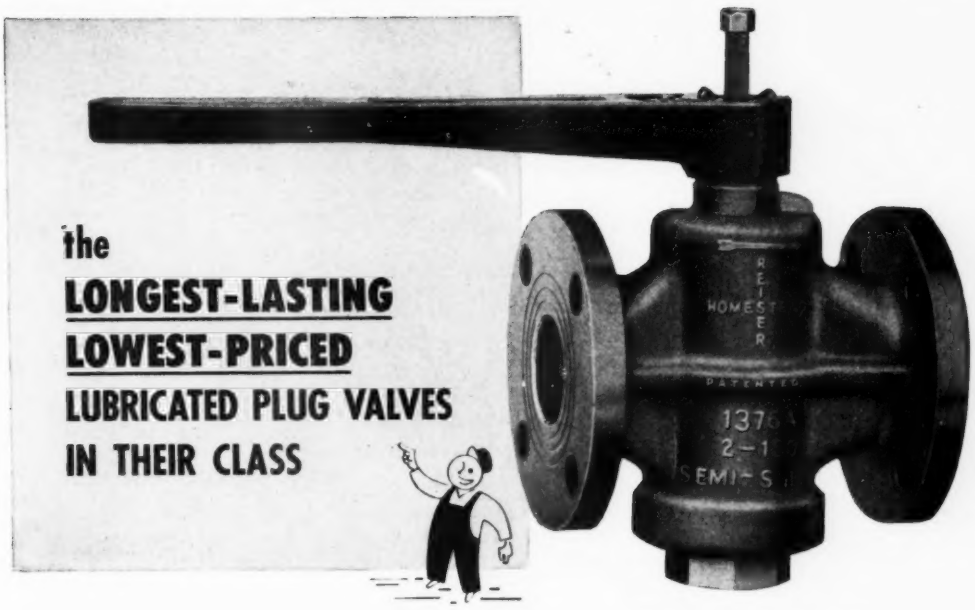
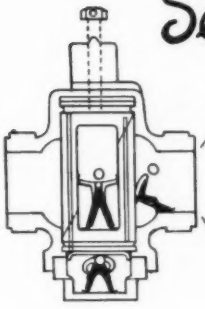


HOMESTEAD-REISER

Self-Seald LUBRICATED PLUG VALVES



HOW THE "SELF-SEALD" PRINCIPLE WORKS

In addition to a full lubricant seal around the ports and around the top and bottom of the valve, the wedge-action of the plug under line pressure, constantly presses the finely-finished surfaces of the plug outward against the seating surfaces of the body. This self-sealing action keeps the plug surfaces in contact at all times with the mirror-like bore of the body. The plug thus automatically adjusts itself for wear, assuring extra long life and maximum leakless service.

In both screwed and flanged types, Homestead-Reiser Valves are the lowest-priced, full-port-area valves in the 200 lb. oil-water-gas, 150 lb. steam working pressure class.

They provide:

- **100% area of standard pipe**
- **100% lubricant seal around ports**
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- **Extreme economy of lubricant**

We designed and built Homestead-Reiser Valves to outlast all other lubricated plug valves in their class. Their ability to do so, and their superior performance in service, have been established in practically every industry during the past seven years.

For full details write for Catalog 39—Section 5

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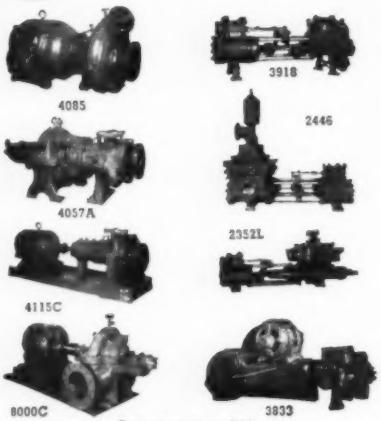

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Pipe-Line Construction

FOLLOWING is a tabulation of pipe-line projects, both domestic and foreign, which are planned or under construction. Included are crude-oil, products, and natural-gas lines. The list was compiled from surveys made by The Oil and Gas Journal.

Crude-Oil Pipe Lines—Domestic

Humble Pipe Line Co. 371 miles, 18-in., under way, West Texas-Satsuma Station to Baytown, Tex.; 178-mile western section contracted to Morrison Construction Co.; 193-mile eastern section contracted by Anderson Brothers Corp.

Mid-Valley Pipe Line Co. (Sun and Sohio)—1,000 miles, 20-22-in., under way, Longview, Tex., to Mayersville, Miss.-Covington, Ky., to Lima, Ohio. Contracts let for 857 miles as follows: Section 2, Haynesville, La., to Mayersville, Miss., Latex Construction Co.; spread office, Farmerville, La.; F. A. Silar, general superintendent; W. A. Briley, spread superintendent; office at Haynesville, La., W. H. Hayes, superintendent; M. L. Thompson, assistant superintendent. 41 miles, 12-in., lateral, Delhi to Lake Providence, La.; headquarters, Lake Providence; E. C. Norris, general superintendent; R. E. Thornton, superintendent. Section 3-A, Mayersville to Oakland, Miss., Associated Pipe Line Contractors, Inc.; J. A. Williams and L. H. Gray, spreadmen; Section 3-B, 4-A, Oakland, Miss., to Henderson, Tenn., Eastern Construction Co.; Section 4-B, 5-A, Henderson to Clarksville, Tenn., Eastern Construction Co.; Section 5-B, 5-A, Clarksville, Tenn., to Elizabethtown, Ky., field office, Clarksville, Tenn., Fred L. Byers, superintendent; Britton Construction Co.; Section 6-B, 111 miles of 22-in., Elizabethtown to Hebron, Ky., H. L. Gentry Construction Co., Frank Morris and Jim Mitchell, spreadmen; Section 7 South, Hebron, Ky., to Eaton, Ohio, Britton Construction Co., field office, Hamilton, Ohio; spreadman, Fred Peters; Section 7 North, Eaton to Lima, Ohio; Section 8, Magnolia, Ark., to Haynesville, La.

Cumberland and Tennessee rivers, Eastern Construction Co.; field office, Clarksville, Tenn., Fred L. Byers, spreadman.

Portland Pipe Line Co., Montreal Pipe Line Co., Ltd.—234 miles, 18-in., planned, Portland, Me., to Montreal, Que., Canada, contracted as follows: Oklahoma Contracting Co., 85 miles in Section 1 at southern end; Portland, Me., to Gorham, N. H. Associated Pipeline Contractors, Inc., Section 2, 81 miles; and Fred Mannix Co., Ltd., 68 miles, Section 3, in Canada.

Richfield Oil Corp.—40 miles, 10-in., Cuyama Valley-Newhall, Calif., planned; Bechtel Corp., contractor; central plant, Watson, Calif., 60 miles, 14-in., applying field joints, Newhall-Wilmington, Calif.; under way; Bechtel Corp., contractor.

Shell Pipe Line Corp.—190 miles, $10^{3}/_{4}$-in., take up, Cushing, Okla., to Emmitt, Mo.; under way; Trojan Construction Co., Inc., contractor; spread office at Mount Vernon, Mo.; Maurice W. Crawford, spreadman.

160 miles, $10^{3}/_{4}$-in., Cushing, Okla., to Elk City, Okla.; under construction; Trojan Construction Co., Inc., contractor; field office, El Reno, Okla.; Swede Tillotson, spreadman; Tulsa Pipe Coating Co., coating contractor.

Texas-Empire Pipe Line Co.—40 miles, 16-in., authorized, Wilmington, Ill., to East Chicago, Ind.

Texas-New Mexico Pipe Line Co.—61 miles, 10-in., authorized, Colorado City to Borden County, Texas. Contracted as follows: 40 miles, $10^{3}/_{8}$-in., Borden County to Colorado City pump station, Scurry County, Carl H. Dunn; 16.08 miles, $6^{5}/_{8}$-in., and 5.41 miles, $4^{1}/_{2}$-in., Borden and Howard counties, Texas; Wright Construction Co., contractor.

Products Pipe Lines—Domestic

Buckeye Pipe Line Co.—Lima, Ohio, to Speedway, Ind., 140 miles, 8-in., nearing completion by H. L. Gentry Construction Co.; field office, Noblesville, Ind.; Frank Morris and Jim Mitchell, spreadmen.

Great Lakes Pipe Line Co.—261 miles, 12-in., under way; contracted as follows: 52 miles, 15-in., Albert Lea to Fairbault, Minn.; under construction; Sheehan Pipe Line Construction Co., contractor; field office, Albert Lea, Minn.; C. W. Henderson, spreadman. O. R. Burden Construction Co., 64 miles north from Des Moines; field office, Nevada, Iowa; G. D. Lewis, spreadman; A. C. Holder Construction Co., 72 miles to Iowa-Minnesota state line; Williams Brothers Corp., 20 miles, Mississippi River crossing and line to terminal and station. Kansas and Missouri river crossings, R. H. Fulton & Co.; field office, Kansas City; Ed Veach, spreadman.

165 miles, 12-in., Irvington, Neb., to Sioux Falls, S. D.; planned and 390 miles, 12-in., Oklahoma to Kansas City, for early construction.

Salt Lake Pipe Line Co.—242 miles, 6-8-in., Boise, Idaho-Pasco, Wash., planned.

Natural-Gas Pipe Lines—Domestic

Alabama-Tennessee Natural Gas Co.—Planned, Muscle Shoals-Decatur, Ala., 36 miles, 8-in., and Decatur-Huntsville, Ala., 27 miles, 6-in.

Arkansas Louisiana Gas Co.—162 miles, 20-in., under construction, Waskom, Tex., and Perla, Ark.

70 miles, 20-in., under construction, Waskom, Tex., to Magnolia, Ark.; Anderson Brothers, contractor; field office, Greenwood, La.; J. D. Brown, spreadman; field office, Plain Dealing, La.; Truman Anderson, spreadman.

Atlantic Gulf Gas Co. (United Gas Pipe Line Co.)—1,530 miles, planned, Alabama-Florida-Georgia-South Carolina.

Central Hudson Gas & Electric Corp.—40 miles, authorized, Tuxedo, N. Y., station Home Gas Co. line now under construction, to Poughkeepsie, N. Y.

Central Kentucky Natural Gas Co. 36 miles, 12-20-in., planned, Kentucky loops.

Chicago District Pipe Line Co.—41 miles, 24-in., planned, Joliet, Ill., to Chicago.

City of Indianapolis, Ind., Inc.—55 miles 16-in., proposed, Indianapolis to Texas Eastern Transmission Corp.'s system.

Cities Service Gas Co.—47 miles, 3-4-16-in. planned, in Kansas.

Coastal Pipe Line Co.—1,000 miles, planned, Texas to Norfolk, Va.

Colorado Interstate Gas Co.—38 miles, 20-in., planned, Texas Panhandle and Hugoton field, Kansas, to Denver, looping. Cheek Construction Co., contractor; Troy Cheek, superintendent.

Colorado-Wyoming Gas Co.—41 miles, planned, Greeley, LaSalle, and Windsor, Colo., areas.

Commonwealth Natural Gas Corp. 537 miles, 20-in., planned, West Bend, Ky., to Norfolk, Va.

200 miles, planned, Green County, Virginia, to Norfolk.

Egyptian Natural Gas Co.—80 miles, 6-8-in., planned, Norris City to Salem-Centralia, Ill., areas.

East Tennessee Natural Gas Co.—398 miles, 3-16-in., planned, Nashville-Chattanooga-Knoxville, Tenn., and lateral lines.

172 miles, 22-in., under construction, Greenbrier, Tenn., to Oak Ridge; Oman-Fulton & Brodie, contractor. Office, spread 1, Cookeville, Tenn.; H. P. Crawford, spreadman. Spread 2 office, Crossville, Tenn.; A. A. Carrigan, spreadman. Spread

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Full diameter, 90° laterals
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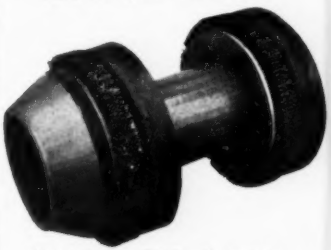

This 22" Type RC-5 will traverse
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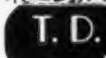

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3 office, Harriman, Tenn.; M. L. Boyd, spreadman; J. T. Brodie, general superintendent.

185 miles, 16-in., Lobelville-Chattanooga, Tenn., contracted by Walters & Saigh Construction Co., for construction in 1950; 120 miles, 12-in., Chatanooga-Knoxville, Tenn.; contracted by Walter and Saigh Construction Co., for construction in 1950; 100 miles of laterals to be laid in 1950. Construction 150 miles, 16-in., Knoxville-Bristol, Tenn., under consideration.

El Paso Natural Gas Co.—All work done by company crews.

Looping of 26-in., New Mexico-California line and connection with Pacific Gas & Electric Co. at Needles, Calif. 352 miles, 30-in., completion November 1950.

450 miles, 30-in., under construction, Eunice, N. M.-Blythe, Calif., looping; completion March 1950.

450 miles, 24-in., planned, San Juan basin, New Mexico to Franconia, Ariz.

Home Gas Co.—70 miles, planned, Orange, Sullivan-Rockland counties, New York-Cattaraugus County, New York, areas.

Jersey Central Power & Light Co.—39.4 miles, 10-in., planned, New Jersey to Coast system, Texas Eastern Transmission Co.'s Big Inch.

Michigan-Wisconsin Gas Co.—185 miles, 4-14-in. laterals, Milwaukee-Fond du Lac, Sheboygan, and Green Bay, Wis., under construction; C. C. Griffis Construction Co., contractor; Paul Means, superintendent for Lake Del Mort crossing.

Montana-Dakota Utilities Co. and Montana-Wyoming Gas Pipe Line Co.—340 miles, 12¾-in., planned, Worland, Wyo., to Cabin Creek, Mont.

Montana Power Co.—83 miles, 12¾-in., planned, Butte to Bozeman, Mont.

Northeastern Gas Transmission Co.—511 miles, up to 20-in., planned, in New England area.

Northern Natural Gas Co.—41 miles, 20-in., under construction, Southwest from Garden City, Kans.; R. H. Fulton & Co., contractor.

116 miles, 4 to 20-in., in Liberal and Garden City, Kans., areas; contracted; R. H. Fulton & Co., contractor; field office, Garden City, Kans.; Jerry Nash, spreadman.

88 miles, all sizes, planned, Kansas-Nebraska looping.

270 miles, 26-in., planned, additions to system north of Kansas.

Northwest Natural Gas Co.—750 miles, planned; Washington, Oregon, and Idaho.

Pacific Gas & Electric Co.—506 miles, 34-in., under construction, Topock, Ariz.-Milpitas, Calif.; Bechtel-Price-Conyes, contractor; spread office, Coyote, Calif.; R. L. Bowman, general superintendent.

Panhandle Eastern Pipe Line Co.—356 miles, 26-in., authorized, looping in Texas, Oklahoma, Kansas, Missouri, Illinois, Indiana, Ohio, and Michigan.

Peoples Gas Light & Coke Co.—Planned 42 miles, 24-in., Joliet-Chicago, Ill.

Phillips Petroleum Co.—25 miles gathering system in West Edmond, Okla., field; under construction; Vaughn & Taylor Construction Co., Inc., contractor; spread office Edmond, Okla.

Piedmont Natural Gas Corp.—1,350 miles, 20-in., planned, Greenville, Miss., to Norfolk, Va.

South Jersey Gas Co.—77 miles, planned, Camden to Atlantic City.

Southern Natural Gas Co.—138 miles, 20-22-in., planned, Chattanooga, Tenn., to Lexington, Miss.

375 miles, 24-in., planned, Gwinville, Miss., to Atlanta.

225 miles, 16-in., planned, Colfax, Ga., extension.

110 miles, 11-in., considered; extension.

314 miles, 18-in., planned; extension.

171 miles, 16-in., planned; extension.

118 miles, 13-in., planned; extension.

Southern Union Gas Co.—78 miles, 8-10-14-in., planned, New Mexico loops and laterals.

Tennessee Gas Transmission Co.—65 miles, 16-in., planned, Ohio-Pittsburgh spur.

790 miles, 20-26-in., planned, Burnaugh, Ky., to Boston, including 400-mile line to Buffalo.

992 miles, 30-in., planned, first 150 miles of loops to be laid at Monroe, La., Greenville, Miss., Midland and Portland, Tenn.

25 miles, 30-in., Hardeman and McNairy counties, Tennessee; H. C. Price Co.; field office, Selmer, Tenn.; J. A. Reutzel, spreadman.

70 miles, 26-30-in., between stations 104 and 110; Anderson Brothers Corp.; field office, Richmond, Ky.; E. C. McCoy and Arkie Hobson, spreadmen.

170 miles of 26 and 30-in., contracted by Anderson Brothers Corp., in Kentucky.

Texas-Eastern Transmission Corp.—1,400 miles planned, Texas to Pittsburgh loops.

Texas Gas Transmission Corp.—103 miles, 20-in., Carthage, Tex., to near Lisbon, La., (Sharon); under construction; N. A. Saigh Co., Inc., contractor; Carthage, Tex.; Bob Floyd, representative. Construction subcontracted: (1) Fowler Brothers, 43 miles from Carthage to Red River, field office at Carthage; M. C. Johnson, spreadman; (2) 63 miles to Sharon station, Oklahoma Contracting Co. (J. R. Horrigan) field office at Minden, La.; Ed Flanagan, spreadman.

Midwestern Constructors, Inc., 80 miles, 26-in., in Jefferson County, Indiana, and Warren County, Ohio; being completed; R. Carl Stanley, superintendent in charge; field offices, Hamilton and Middletown, Ohio; M. T. Wilhite, spreadman.

32 miles, planned, Slaughters, Ky., to Evansville, Ind.

Texas Illinois Natural Gas Pipeline Co.—1,400 miles, 30-in., planned, La Gloria field, Texas, to Joliet, Ill.

Transcontinental Gas Pipe Line Co.—Texas-New York 1,840 miles, 30-in., main line and 500 miles, 4 to 22-in., gathering line. Section of 605 miles of 30-in. nearing completion.

Section (unnumbered), Rio Grande Valley to Eunice, La., 502 miles; contracts not let. Section 3, Bassfield, Miss., to Tombig-

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If any phase of your pipe line operation is below peak performance, it may be solved by one of the following steps:

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1369
MILES
During our fiscal year, ending Nov. 30, 1948, five spreads of Latex Construction Company laid and took up a grand total of 1369* miles of pipe. This imposing mileage of pipe line work was divided as follows:
Miles of Pipe laid, 16" and larger 588
Miles of Pipe laid, 8", 10" and 12" . . .379
Miles of Pipe taken-up and reconditioned. .402
*This figure does not include the mileage under contract at the end of 1948, to be completed during 1949, amounting to 181 miles.
Latex CONSTRUCTION COMPANY
General Contractors
Oil-Gas-Gasoline-Water Pipelines
HOUSTON, TEXAS ATLANTA, GA.
L. H. Favrot — G. A. Peterkin —
J. W. Sharman — R. P. Gregory

bee River, Alabama, 112 miles; Wunderlich-Griffis Construction Co. Section 5, Coosa River, Alabama, to Newman, Ga., 103 miles; Midwestern Constructors, Inc.; field office, Alexander City, Ala.; M. T. (Bill) Wilhite, superintendent. Section 6, Newman, Ga., to Danielsville, Ga., 108 miles; Williams Brothers Co.; field office, Monroe, Ga.; Thelmer Davis, spreadman. Section 7, Danielsville, Ga., to Saluda River, South Carolina; 86 miles; Williams Brothers Co. Section 8, Saluda River, South Carolina, to Catawba River, North Carolina, 102 miles; R. H. Fulton & Co. Section 9, Catawba River, North Carolina, to North Carolina-Virginia boundary, 100 miles; R. H. Fulton & Co. Section 10, North Carolina-Virginia boundary to James River, Virginia; 86 miles; O. R. Smith Contracting Corp. Section 11, James River, Virginia, to Potomac River, Virginia; 110 miles; O. R. Smith Contracting Corp. Section 12, Potomac River, Virginia, to Susquehanna River, Pennsylvania, 76 miles; Associated Engineers & Contractors, Inc. Section 13, Susquehanna, Pennsylvania, to Delaware River, 90 miles; Wunderlich & Griffis Construction Co. Section 14, Delaware River to Hackensack River, New Jersey, 61 miles; Wunderlich & Griffis Construction Co. Section (unnumbered), Hackensack River, New Jersey, to Hudson River, New York, 23 miles; Oklahoma Contracting Co.; field office, Edgewater, N. J.; M. E. Shiflett, spreadman.

Trunkline Gas Supply Co.—1,775 miles, 10-26-in., planned; includes 740-mile, 26-in. main line from Lake Charles, La., to Tuscola compressor station on Panhandle Eastern Pipe Line Co., and 1,035 miles, 10-24-in. Lake Charles, La., to McAllen, Tex., field lines, pending FPC approval of changed plans.

United Fuel Gas Co.—32 miles, 20-in., authorized; Roane, Calhoun, and Wetzel counties, West Virginia.

United Gas Pipe Line Co.—90 miles, 16-in., planned. West Bay field to New Orleans.

105.6 miles, 20-in., planned, loop line paralleling Carthage, Tex.-Sterlington, La., and extending on to near Monroe, La.; O. C. Whitaker Co., contractor for 42-mile, 20-in. section, Ruston, La., to Red River; field offices, Ringgold and Bienville, La.; Merle Tatum, spreadman; Rosson-Richards Co., coating contractor.

26 miles in Louisiana conecting with East Texas system, planned.

United Natural Gas Co.—29 miles, 12-in., authorized, laterals, Elk County, Pennsylvania.

Virginia Natural Gas Co.—153 miles, planned, Buckingham to Richmond and Portsmouth, Va.

Crude-Oil Pipe Lines—Foreign

Interprovincial Pipe Line Co. (Imperial)—1,150 miles, 16-20-in., Edmonton area, to Superior, Wis.; contracted as follows: 480 miles, 20-in., Edmonton-Regina, Canadian-Bechtel, Ltd., associated with Fred Mannix Co., Calgary, Alta.; 340 miles, 16-in., Regina to Gretna, Man., Williams Brothers Corp.; 360 miles, 18-in., Minnesota and Wisconsin, Anderson Brothers Corp.

Iraq Petroleum Co., Ltd.—620 miles, 16-in., Kirkuk-Haifa, Palestine, shut down.

556 miles, 30-32-in., planned, Kirkuk, Iraq-Banias, Lakatia.

Middle East Pipe Line Co.—800 miles, 34-36-in., planned, Iran-Levantine Port.

Monreal Pipe Line Co., Ltd.—(See Portland Pipe Line Co. item in domestic crude oil list.)

Petroleos Mexicanos—280 miles, $12\frac{3}{4}$-in., authorized, Poza Rica to Salamanca, Mexico.

Santos Jundial Railroad—30 miles, 18-in., planned, Santos to Sao Paulo, Brazil.

Trans-Arabian Pipe Line Co.—1,067 miles, 30-31-in., under construction, Abqaiq, Saudi Arabia, to Sidon, Lebanon; International Bechtel, Inc., Williams Brothers Corp., Graver Tank & Mfg. Co., and Chicago Bridge & Iron Co., contractors.

Yacimientos Petroliferos Fiscales de Argentina.—25 miles, under way, Tupungato-Lujan de Cuyo.

Two joints of 30" pipe welded together to form a length 62' long, shown in the final Bending Stage in the "Cinch" Bender. Note how the pipe was bent continuously through the Welded Joint. This demonstration established firmly, quality on an Economical Basis.

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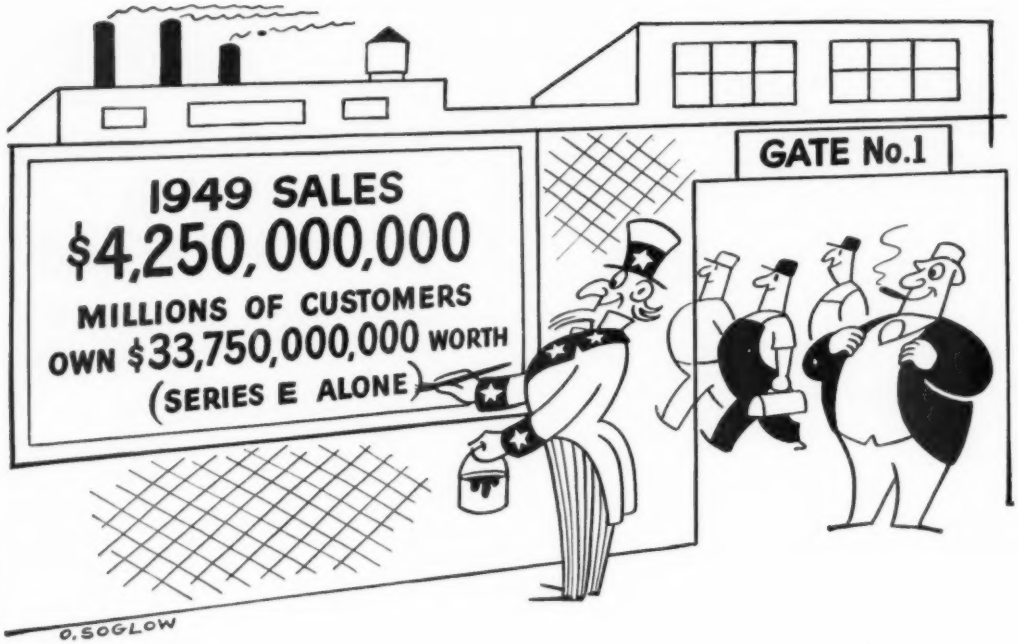

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For all the help you need, get in touch with your State Director, U. S. Treasury Department, Savings Bonds Division—or write the Savings Bonds Division, Treasury Department, Washington, D. C.

The Treasury Department acknowledges with appreciation the publication of this message by

THE OIL AND GAS JOURNAL
Tulsa 1, Oklahoma

This is an official U. S. Treasury advertisement prepared under the auspices of the Treasury Department and The Advertising Council.

409 miles, under way. Plaza Huincul-Bahia Blanca.

Products Pipe Lines—Foreign

Petroleos Mexicanos.—160 miles, $10^3/_4$-in., authorized, Minatitlan to Salina Cruz, Mexico.

Cia. des Pipe Lines Petroliers Francias.—150 miles, 10-in., planned, Le Havre to Paris, France.

Colombian Government.—268 miles, planned, Puerto Berrio to La Dorada, 90 miles; Puerto Berrio to Medellin, 103 miles; Buena Ventura to Cali, 75 miles.

Northern Pipe Line, Ltd.—300 miles, 10-in., planned, Montreal to Toronto, Canada.

Santos Jundial Railroad.—40 miles, 10-in., planned, Santos to Sao Paulo to Campinas, Brazil.

Natural-Gas Pipe Lines—Foreign

Direccion General del Gas del Estado.—310 miles, planned, Plaza Huincul to Neuquen, Argentina, to the vicinity of General Conesa, Argentina.

62 miles, Comodoro Rivadavia to Caleto Olivia, under way.

Northwest Natural Gas Co.—950 miles, 24-in., planned, Alberta fields to Vancouver, B. C., Seattle, Wash., and Portland, Ore.

Petroleos Mexicanos.—205 miles, 16-in., considered, Monterrey to Torreon, Mexico.

260 miles, 20-in., considered, Monterrey-Tampico-Poza Rica area, Mexico.

Petroleos Mexicanos, Mexican Gas Co., and Industrial Gas Co.—600 miles, planned, Reynosa, Tamaulipas to Mexico City, D. F., Mexico.

Westcoast Transmission Co., Ltd.—1,400 miles, 30-in., planned, North Alberta, Vancouver, B. C., and northern California.

Western Pipe Lines.—710 miles, 22-24-in., planned, Alberta fields, Saskatoon, Alta., to Winnipeg, Man., Canada.

Texas Gas Transmission Co. Puts New System in Service

(Continued from page 92)

When the new line is completed later in January to Middletown, Ohio, Texas Gas Transmission will be ready to deliver to Texas Eastern initial minimum quantities of 123,000,000 cu. ft. a day, which will be increased by the addition of compressor horsepower to 235,000,000 cu. ft. a day by mid-1950. Texas Eastern will sell this amount through a new line in Ohio to the East Ohio Gas Co., serving Akron, Canton, Cleveland, and Youngstown, Ohio, as well as to Manufacturers Light & Heat Co. and the Ohio Fuel Gas Co., which serve numerous communities in Ohio, Pennsylvania, and West Virginia, and Philadelphia Gas Works, Consumers Gas Co., Allentown-Bethlehem Gas Co., Harrisburg Gas Co., and National Gas & Oil Co.

Ten compressor stations have a total of 68,800 hp.

With completion of the new 800-mile line from Carthage to Middletown and addition of compressor horsepower, Texas Gas Transmission will have by the middle of 1950 a pipe line system totaling 2,400 miles of pipe with total capacity over 650,000,000 cu. ft. of gas a day.

Doubled Use of FM Channels For Mobile Radio Practical

Means of doubling available FM channels for mobile radio communications (such as is widely used in the pipe-line industry) without increasing frequency allocations, were successfully demonstrated in recent tests conducted at Radio Corporation of America's engineering-products department in Camden, N. J. Among observers were engineers of the Federal Communications Commission, the U. S. Army Signal Corps, and representatives of public-utility and transportation industries, as well as pipeline men.

Subject of the tests was a new mobile communications system, developed by R.C.A., which the company claims is 1,000 times more selective than any previous system.

Limited selectivity of conventional mobile radio receivers, it was explained, has made it impracticable for the FCC to assign adjacent channels to users in any one area. Thus, among four of the channels used in the test—152.21, 152.27, 152.33, and 152.39 mc., respectively—it has not been feasible to assign 152.21 mc. and 152.27 mc. in the same community. Instead, it has been necessary to stagger them—alternate channels 152.21 and 152.33 mc. to one city, 152.27 and 152.39 mc. to another.

The selectivity achieved in the new receiver, used with v.h.f. (very-high-frequency) transmitters specially designed with low spurious emission to keep signals in channel, was shown to make possible clear reception on the four adjacent channels, even in vehicles lined up side by side.

In addition to making possible adjacent channel operation, the company stated, equipment is able to receive messages in a given channel even when the vehicle is within 0.4 mile of land stations transmitting on other channels, whereas intermodulation interference normally cuts off communications with such vehicles when they move within a radius of $1^1/_2$ miles of other stations.

The recent test, employing four adjacent channels for transmission from land station to vehicles and another set of four adjacent channels for transmission from vehicles to land stations, was a sequel to an earlier test of the equipment for FCC engineers, when only two adjacent channels were used.

In the first of four separate tests last week, four vehicles, lined up outside a building of R.C.A.'s Camden plant, received signals transmitted on different adjacent channels by four land stations—one in Philadelphia and three in Camden.

The observers were then taken to one of the land stations, on the roof of an R.C.A. plant building, where four "land station" receivers picked up messages from the four mobile units below, transmitting on adjacent channels 157.47, 157.53, 157.59, and 157.65 mc.

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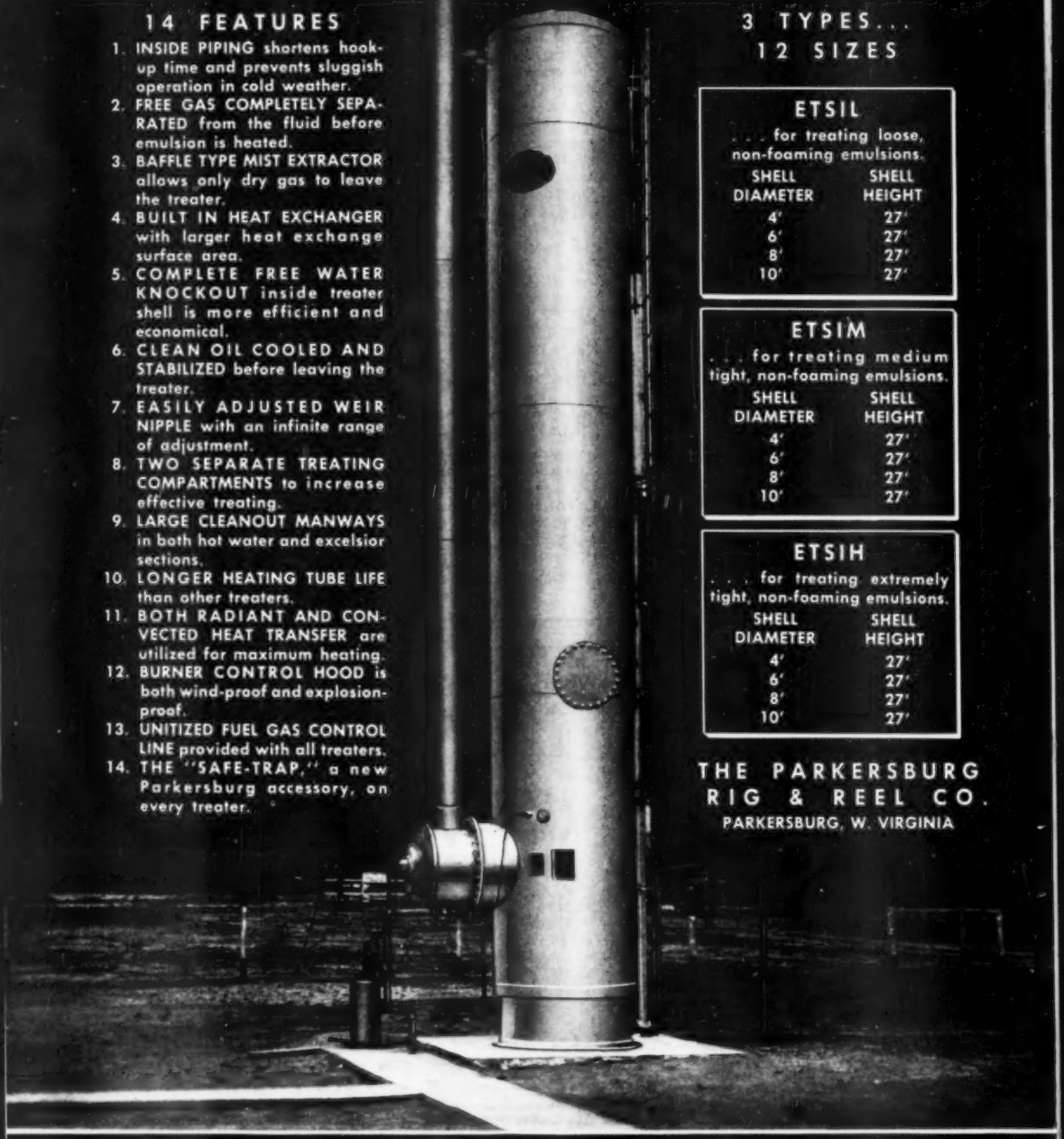

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NATURAL GAS

Gas Facilities Approved For Pennsylvania Areas

CONSTRUCTION and operation of pipe-line facilities in eastern Pennsylvania which will be used for the transportation and sale of natural gas by Manufacturers Light & Heat Co. to the distribution companies serving several cities in the area has been given authorization by Federal Power Commission. Among cities which will benefit from service will be Harrisburg, Allentown, Bethlehem, Reading, and Lancaster.

The authorization involves the delivery of natural gas by Texas Eastern Transmission Corp. to Manufacturers, which in turn will construct and install connections with the pipeline systems of Allentown-Bethlehem Gas Co., Harrisburg Gas Co., Consumers Gas Co., and Lancaster County Gas Co. These firms are controlled by United Gas Improvement Co. of Philadelphia.

Estimated cost of the facilities is $232,000 for Manufacturers; $36,170 for Texas Eastern; and $1,266,900 for the four United Gas Improvement companies (Allentown, $54,800; Consumers, $537,300; Harrisburg, $453,800; Lancaster, $221,000).

Gas Requirements Listed

Natural-gas requirements of the four U. G. I. companies for the maximum days in 1950 and 1954, respectively, are: Allentown, 1,850,000 and 4,400,000 cu. ft.; Harrisburg, 2,500,000 and 4,330,000 cu. ft.; Consumers, 1,800,000 and 2,600,000 cu. ft.; and Lancaster, 2,340,000 and 4,210,000 cu. ft.

The natural gas will be supplied from Manufacturers' system and from Texas Eastern, the latter company previously being ordered by the commission to deliver a total of 7,500,000 cu. ft. daily to Allentown, Consumers, and Harrisburg. One of the principal issues involved in the proceedings was the question of whether these two firms would be better served, both in standpoint of rates and service, directly by Texas Eastern or through the medium of Manufacturers as a third party. FPC found that each firm will reflect savings in capital costs as well as gains in both gross and net income if natural-gas service is available to the extent of full requirements from Manufacturers.

While each U. G. I. company asked FPC to find in effect it was not subject to FPC jurisdiction, the commission found that Consumers, Harrisburg, and Allentown will use facilities to transport gas in interstate commerce, and in the sale for resale in interstate commerce of gas for ultimate public consumption, and therefore are subject to requirements of the Natural Gas Act.

Lancaster will build 9.5 miles of line; Allentown will build 2.3 miles of line; Harrisburg, 18 miles; and Consumers 21 miles. Texas Eastern will construct metering and regulation stations.

Alum Rock's Proposed Gas Tariff Suspended by FPC

Federal Power Commission has suspended a proposed natural-gas tariff filed by Alum Rock Gas Co., Port Allegany, Pa., which would increase the firm's rates for natural gas sold at wholesale to United Natural Gas Co. by approximately $53,000 annually. A hearing has been set by the commission to begin in Washington, D. C., February 20.

The proposed change would have been effective as of January 1, 1950, and represents an increase equivalent to about 8 cents per 1,000 cu. ft. of natural gas. United Natural is Alum Rock's sole wholesale customer.

Alum Rock, in support of its proposed increase, said that its present rates and charges to United Natural, which purchases approximately 96 per cent of Alum Rock's output, are so low as to have resulted in a deficit in net utility income for the 12-month period ending August 31, 1949, of $28,427, and in a net deficit in net utility income for the years 1944 to 1948, inclusive, of $67,482.

United Natural has filed a protest against the increased rates with FPC. It owns and operates a gas-transmission system located in Pennsylvania and Ohio.

I.N.G.A.A. Asks Permit to Intervene in Delhi Case

A petition for leave to intervene in the proceedings concerning application of Delhi Oil Corp. for a status of determination has been filed with Federal Power Commission by the Independent Natural Gas Association of America.

In its petition I.N.G.A.A. said that the issues involved in the proceeding are of vital importance to its members and they might be aggrieved because of any order or orders of the commission entered. The principles which will be involved in any order or orders of FPC in the proceedings are of importance to all segments of the natural-gas industry, especially the producers of natural gas, I.N.G.A.A. said. "The petitioner, by its charter, is required 'particularly to protect the interests of the producers of natural gas,'" I.N.G.A.A. stated.

Delhi Oil filed a new application for status determination after FPC had held last March that, with respect to sales the firm proposed to make to El Paso Natural Gas Co., Delhi would come within the purview of an FPC order which states that the commission will not assert jurisdiction over sales made by independent producers and gatherers to natural-gas companies in arm's-length bargaining. FPC in May stated that if Delhi made the proposed sales to El Paso the gas would go into interstate commerce; therefore, Delhi would come under FPC jurisdiction. In September Delhi was notified by FPC that if it made the proposed sales to El Paso the commission could not say in advance whether or not Delhi would be held a natural-gas company, and thus under FPC jurisdiction.

Gas Company Operating Revenues Up in October

The Federal Power Commission, in releasing its October report on operating revenue of 83 natural-gas companies reporting, said that revenues were $72,247,861 for the month, an increase of 4.7 per cent over the $69,013,848 reported for the same month a year ago.

Gas-utility operating income for the month amounted to $8,896,171, down 3.4 per cent from the $9,208,038 reported for October 1948. Net income for the month was $8,544,957 compared to $9,303,799 reported in October 1948, FPC said.

Gas-operating revenue deductions amounted to $63,353,588, an increase of 5.9 per cent and of this total operating expenses accounted for $49,139,080, up 6 per cent; depreciation for $7,166,825, a gain of 12.6 per cent; and taxes for $7,047,683, a decrease of 0.5 per cent.

Sales of gas to ultimate consumers during the month were 121,998,000,000 cu. ft., an increase of 1.5 per cent over the same month a year ago. Sales to residential consumers increased 2.3 per cent, and to commercial and industrial consumers, 2.2 per cent and 1.5 per cent, respectively. Revenues for sales to ultimate consumers increased 2.3 per cent and amounted to $33,116,955. Revenues from the three classes of service, residential, commercial, and industrial, increased 4.1 per cent, 2.2 per cent, and 1.1 per cent, respectively, the report showed.

Gas-operating revenues for the 12-month period ending October 31, aggregated $962,979,280.

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Exploration and Drilling

1949 Was the "Reef Year" in Exploration

AMONG the exploration scientists there is not even a doubt as to the outstanding characteristic of the year 1949. Developments in the Province of Alberta, Canada, and in the Scurry County area of West Texas were so outstanding that the phrase "reef play" dominated the exploration scene.

Geologists are quick to point out that, as so often happens, the idea of finding oil in reefs is not new. In fact it is surprising how many reef fields have been producing for a long time. But in 1949 the time was ripe, the strikes were sensational, and both companies and individuals were ready to back plays. Therefore the idea of "reef oil" swept the country like wildfire.

For some purposes, according to many geologists, it is not illogical to divide oil prospects broadly into three groups. First, structural traps; second, stratigraphic traps; and third, reef traps. Exploration activity searching for structural traps has been with us since the beginning of petroleum geology, and will continue. Exploration for stratigraphic traps is a costly business with our present tools, and the element of luck plays a very large part. Many exploration men will agree with the geologist who said the ideal tool to use in searching for stratigraphic trap fields would be a slim-hole rig that could drill a 10,000-ft. hole for $10,000.

Now we are in the throes of looking for the third type, reef traps. It is generally agreed that usually the problem of finding reef traps is much more difficult than that of finding structural traps, but not nearly as bad as trying to pin down a stratigraphic trap. For reef-trap searching, the problems will vary widely from area to area. That much has been demonstrated so far. But the amount of money and manpower being thrown into the search for reef traps is bound to bring results that will be felt for many years.

It is no secret in geological circles that reefs are present in many parts of the country other than West Texas. There need be no surprise if even the old Appalachian area should be the scene of a reef oil-field strike. Any geologist back there who has looked up his Grabow's "Principles of Stratigraphy"—1924 edition, and even glanced at pages 426 and 427, to say nothing of other references like the bibliography on reefs on pages 461-466, would have found references to several jumping-off places. In view of the wide interest in reef literature, it is highly improbable that several exploration men have not already been busy, and may have sold their companies on the idea.

What is true of the Appalachian area is true of several other spots in the United States, and true of a lot of places around the world. Reefs are fairly common phenomena in the geological column. As long ago as March 15, 1948, J. V. Howell, editor of Volume III, Structure of Typical American Oil Fields (A.A.P.G. publication), used these prophetic words in the forward of that volume:

"Inclusion of the Marine (Illinois) and Norman Wells (Canada) fields, which are controlled by reefs, calls attention to the necessity of more study of these features, in view of the very large areas where they may be expected to occur. The Alberta basin is such an area, where a reef similar to Norman Wells in age and character has been found 900 miles south, at Leduc."

As most geologists know, the reef production in Canada is Devonian in age, the Scurry County reefs are Pennsylvanian, and in the Marine pool referred to above, the reef is Silurian in age. Incidentally, Illinois is not the only state where Niagaran of the Silurian is known to show reef conditions. Reef-play activity in Illinois is certainly in order, and probably further along than is generally realized, simply because it is so obvious once one begins to think about places where reefs have already shown they can produce oil.

Charles J. Deegan

HIGHLIGHTS OF WEEK'S DEVELOPMENTS

WEST TEXAS.—Amerada 1 Von Roeder, Borden County reef discovery, completed for a daily potential of 185 bbl. of 38 -gravity oil, plus 33 bbl. of salt water, through 24/64-in. choke. Top of the reef was minus 4,467 ft., with perforations from 7,100-10 ft. Samedan Oil Corp. and others 1-EA Andrews, northwest side of Robertson field, Gaines County, was a new deep pay for the area, flowing 262.7 bbl. of 40 -gravity oil through 1-in. opening from the Ellenburger at 11,900-60 ft.

SOUTH LOUISIANA.—The Texas Co. has discovered oil in the Little area of Pointe Coupee Parish which previously produced only gas. The 2 Lottie Land & Development Co. flowed 41.8 -gravity oil daily through perforations at 9,114-22 ft. Two offshore wildcats are testing: Pure Oil Co. A-1 State Lease 832, off St. Mary Parish, recorded a flow of 260 bbl. of oil daily plus 140,000 cu. ft. of gas, through perforations at 9,620-28 ft.; off Terrebonne Parish, Magnolia Petroleum Co. B-1 State Lease 673, Eugene Island area, flowed gas-condensate through perforations at 9,816-20 ft. Operators are preparing to squeeze these perforations and test sands at 9,516-20 ft.

ROCKY MOUNTAIN AREA.—Steelco Drilling Co.'s discovery well at Glenrock, Wyoming, flowed 57 bbl. of oil in the first hour and the operator is continuing to test. Delhi Oil Corp.'s south Sussex area discovery, Johnson County, Wyoming, flowed 26 bbl. of oil per hour from the Sussex sand. Water was recovered in the Lakota at Ohio Oil Co.'s Huntsman wildcat, Nebraska, after the well tested gas from third Dakota sand.

N. CENTRAL TEXAS

Ellenburger Discovery Is Indicated in Fisher County

WICHITA FALLS.—During the latter part of the year, Fisher County has shown a big increase in exploration, as well as development drilling. This week field reports indicated the possibility of an Ellenburger discovery in northwestern Fisher County, some 8 miles west of Rotan.

The prospector is Gem Oil Co. 1 M. Medrano, SW NW 104-2-H&TC, placed tentative top on the Ellenburger around 6,959 ft., but did not report elevation. A 1-hour drill-stem test from 6,961-82 ft. recovered 60 ft. of oil and 90 ft. of oil-cut mud with no water. Flowing pressure was 200 psi. and bottom-hole shut-in pressure was 1,750 psi. It was cored ahead from 6,982-88 ft., which recovered 3 ft. of hard dolomite, with fluorescence and gas kick in the mud, but no shows in core recovery. At last report it was coming out of the hole after coring from 6,988-92 ft.

Previous formation tops and tests were: Wolfcamp 3,335 ft., Flippen 4,217 ft., base Permian 4,304 ft., Swastika 4,552 ft., Gunsight 4,610 ft. A core in unidentified formation from 6,403-15 ft. recovered 10 ft. of shaly and 1 ft. of tight sand with spotted stains. A 30-minute drill-stem test from 6,375-83 ft. recovered 70 ft. of mud. A 1-hour test from 6,928-53 ft. recovered 35 ft. of oil-cut mud.

Al G. Hill and others 2 W. P. Bomar, 315-20-T. H. Cosby Survey, 2 miles west of Roby, was drilling below 4,821 ft. in shale.

H. C. Spoor, Jr., 1 L. L. Stuart, 201-3-H&TC, 9 miles southwest of Roby, topped the Canyon lime at 4,150 ft., and was drilling ahead at 4,470 ft.

Fisher County development drilling counted seven operations in the Pardue field and nine at Round Top.

Farris Oil Co. completed its second Caddo gas well in Northeast Parker County, 2 miles southwest of Springtown. The new well, 1 J. P. Hart heirs, E. A. Fleming Survey, was estimated at 3,000,000 cu. ft. daily. Perforations were made from 3,545-85 ft.

Wise County received a new exploratory test as Signal Oil & Gas Co. and Lone Star Producing Co. 1 C. J. Lamance, SW NE Block 29, T&P Survey, A-842. Contract depth was 6,000 ft., with cable tools. Location is about 2 miles northwest of the J. M. Hickey & Sons and others 1 Birdwell, B. Jones Survey, 1 mile southeast of Keeter, which was dry at 6,010 ft. in the Bend conglomerate. The new venture is 1 mile west of Keeter and on a block of about 1,500 acres.

Five miles south of Paradise, Akin & Dimock 1 J. I. Gentry, Block 83, Matagorda CSL, was reported waiting on casing set around 6,000 ft. According to unofficial sources, total depth was 7,167 ft., in the Ellenburger.

Cities Service Oil Co. was drilling ahead after setting 350 ft. of 10-in. surface casing at its 1 S. Williamson, Block 4, Falls CSL Survey, 5 miles northwest of Alvord in northwest Wise County. Contract depth was 8,000 ft.

NORTH CENTRAL TEXAS (DISTRICTS 9 AND 7-B) SUCCESSFUL WILDCAT

Coleman County: Magnolia Petroleum Co. 1 Morris estate, John H. Wood Sur., A-680, 6 mi. NE Coleman, TD 3,615 ft., PB 1,994 ft., top pay 1,972 ft., elev. 1,630 ft., IP flowed 155,000 cu. ft. of gas daily.

NORTH CENTRAL TEXAS (DISTRICTS 9 AND 7-B) WILDCAT FAILURES

Clay County: Fain & McGaha and Sohio Petroleum Co. 1 R. M. Van Landingham "A," W. W. Yearley Sur., A-745, 2 mi. SW Deer Creek, dry, TD 4,600 ft.

W. P. Luse 1 W. P. Luse fee, John Guffey Sur., A-1545, 3 mi. NE Rosston, dry, TD 2,868 ft.

Coleman County: Yeatman Drilling Co. 1 L. G. Norris, 33-2-GH&H, 3 mi. N Silver Salley, dry, TD 3,450 ft., elev. 1,927 ft., Gardner sand 3,224 ft.

Haskell County: W. T. Daniel & W. F. Bonner 1 W. E. Penick, Sec. 36, Wise CSL, Sur. 76, 6 mi. NW Rule, dry, TD 5,212 ft., elev. 1,626 ft., Strawn 5,034 ft., no shows.

Knox County: Stanolind Oil & Gas Co. 1 M. F. Baker, NE NE 51-2-D&WRR, ½ mi. N Knox City, dry, TD 6,186 ft., elev. not reported, Caddo 5,583 ft., Mississippian 5,858 ft., Ellenburger 6,093 ft.

Montague County: Russell Maguire 1 J. M. Pyees, J. T. Gibson Sur., A-311, 2½ mi. S Montague, dry, TD 6,422 ft., elev. 1,072 ft.

Stephens County: McElroy Ranch Co. 1 Eugene Tipton, Sec. 116, TE&L Sur., A-470, 16 mi. NW Breckenridge, dry, TD 4,740 ft., elev. 1,247 ft., Palo Pinto 1,902 ft., Caddo 3,744 ft., Chester 4,515 ft., Ellenburger 4,656 ft.

Taylor County: Sojourner Drilling Co. 1 E. H. Cordill, Sec. 15, Blk. 9, SPRR, 3 mi. S Blair, dry, TD 3,865 ft., Noodle Creek 2,525 ft., Flippen 2,875 ft., Reef 3,780 ft.

MISSISSIPPI

Casing Set on Humble Oil's Adams County Wildcat

JACKSON.—Humble Oil & Refining Co. has set casing at its Adams County wildcat, 1 Roane F. Byrnes, 13-5n-3w, in an effort to evaluate the commercial worth of all sands logged in an interval from 10,974-11,003 ft. Hole is bottomed at 11,173 ft. Oil shows are reported to have been logged in the Wilcox sand at approximately 6,000 ft.

Humble's second closely watched Adams County wildcat, the D-1 McKittrick, 50-7n-3w, near the Natchez city limits, is drilling below 10,500 ft. This test is being drilled tight but is reported to have logged an 8-ft. oil sand in the Wilcox.

In Pickens area, Yazoo County, Carter Oil Co.'s Smackover wildcat, the 1 J. L. Wilson, is reaming to core ahead after two drill-stem tests. First test was made with packer set at 11,441 ft. testing to total depth 11,462 ft. Tool was open 25 minutes, with no blow or pressure, and recovery was water cushion and 90 ft. of slightly gas-cut mud, and a slight show of sweet gas on top of fluid. Second test was made with packer at 11,512 ft., testing to 11,527 ft., using ¼-in. top and bottom chokes and 3,720 ft. of water cushion. Tool was open 25 minutes with a good blow throughout, however, top pressure built up to only ½ psi. Recovery was 39 stands of water cushion, 33 of which were gas-cut with a slight scum of oil, and three stands of gas-cut mud. Bottom-hole flowing pressure was 1,800 psi. and shut-in bottom-hole pressure was 4,325 psi.

First activity since the discovery well was completed in the new Possum Corner field is getting under way. American Republics Corp. is clearing location for a test in Section 4-4n-2w, Wilkinson County. Test will be a direct east offset to the discovery well drilled by Danciger.

MISSISSIPPI WILDCAT FAILURES

Adams County: Sohio Petroleum Co. 1 J. W. McDowell, 55-7n-3w, dry, TD 6,510 ft.

Jones County: Sunnyland Contracting Co. 1 A. J. Green, 27-10n-11w, dry, TD 8,215 ft.

Washington County: C. H. Murphy-Sun Oil Co. 1 James Edwards, 31-16n-7w, dry, TD 4,158 ft.

ALABAMA WILDCAT FAILURE

Escambia County: Dan L. Reynolds 1 St. Regis Paper Co., 23-1n-8e, dry, TD 6,658 ft.

ROCKY MOUNTAIN

Glenrock Area Discovery Flows Oil on Tests

DENVER.—Steelco Drilling Co.'s discovery well in the Glenrock area, Converse County, Wyoming, flowed 57 bbl. of oil in the first hour, and 35 bbl. in the second hour through ½-in. choke. Later, through ¼-in. choke it is reported the well made as much as 70 bbl. per hour for 2 hours. The well is the 1 McDonald, SW NE SE 37-34n-75w, ¼ mile north of the town of Glenrock and 5 miles northeast of the Big Muddy field. The well was drilled to 7,258 ft. and casing cemented at total depth with production from casing perforations opposite the Muddy sand between 7,202-26 ft. This wildcat discovery led to an extensive leasing campaign throughout the south side of the Powder River Basin and it is probable additional wildcats will be drilled as a result of this discovery. In the meantime Steelco, a Chicago firm, has spudded a second well, ½ mile east of the discovery, and Phillips Petroleum Co., which holds a sizeable lease block in the area, has made location for a Muddy sand test ¼ mile southeast of the discovery well. Continental Oil Co. has farmed out to Far West Oil Co. its 7,000-acre block immediately south of the town of Glenrock and a wildcat is planned on this block within the next few months.

The Delhi Oil Corp. discovery south of the Sussex pool, Johnson County, Wyoming, flowed 26 bbl. of oil per hour on a short test and is now shut in for storage. The well is 1 Government, SE NW NE 35-42n-78w, 1½ miles south of Continental Oil Co.'s closest producer. Production is from the Sussex sand below 3,937 ft. through casing perforations. The well also made oil on drill-stem test of the Shannon sand, topped at 4,448 ft. (?) and was drilled to 5,313 ft., total depth, prior to completion in the Sussex sand. This is the third separate pool to be established in the Sussex area, with two pools developed by Continental within the Sussex Unit proper. The present well is 1 mile south of this unit and with the discovery it is expected that a rapid development program will be started in the area. Continental has its Meadow Creek area unitized, immediately south of the new discovery, and is making location for a test in the area.

In the Huntsman area, Cheyenne County, Nebraska, Ohio Oil Co. is now coring below 5,048 ft. after recovering water in the Lakota sand at its interesting wildcat. Lakota was found at 4,992 ft. and on drill-stem test 4,993-5,003 ft. the well made 1,189 ft. of gassy salt water in 1 hour. This wildcat made more than 20,000,000 cu. ft. of gas on a series of tests in the third bench of the Dakota sand, with additional gas in the second bench. Oil was recovered in tests of the first Dakota. This wildcat is 6 miles southwest of Ohio's Gurley pool, where oil is produced from the first and third Dakota sands.

WYOMING SUCCESSFUL WILDCAT

Murphy Dome, Hot Springs County: Farmers Union Central Exchange 1 Shad, SE SE SE 6-43n-91w, 5,210 ft. TD, PB 4,530 ft., flowed 8.8 bbl. oil per hour for 16 hours, 34° gravity. Frontier formation 1,030 ft., first Frontier 1,030 ft., second Frontier 1,100 ft., third 1,310 ft., fourth 1,405 ft., Mowry 1,520 ft., Thermopolis 1,900 ft., Muddy 2,090 ft., Cloverly 2,312 ft., Dakota 2,380 ft., Lakota 2,452 ft., Morrison 2,475 ft., Sundance 2,705 ft., Gypsum Springs 2,972 ft., Chugwater 3,103 ft., Dinwoody 4,049 ft., Phosphoria 4,102 ft., Tensleep 4,364 ft., Amsden 4,649 ft., Madison 4,957 ft., 7-in. casing 4,869 ft.

WYOMING WILDCAT FAILURES

West Stroner, Campbell County: William Hamm, Jr., 1 Govt., SW NW SW 27-55n-69w, 5,402 ft. TD, abnd., Beaver chalk

3,750 ft., Flood 3,790 ft., Newcastle 5,366 ft.

Lawn Creek, Natrona County: Tide Water Associated Oil Co. 81-22, NE NE NE 22-29n-80w, 5,522 ft. TD, PB 4,487 ft., abnd., Frontier 1,625 ft., Mowry 2,440 ft., Thermopolis 2,546 ft., Sundance 3,055 ft., Nugget 3,370 ft., Alcova 3,540 ft., Red Beds 3,570 ft., Embar 4,190 ft., Tensleep 4,492 ft., Amsden 4,790 ft., Madison 5,000 ft.

Poison Springs, Natrona County: Tide Water Associated Oil Co. 1 Poison Springs, SE NW NE 31-32n-83w, 13,130 ft. TD, band, Mesaverde 4,930 ft., Cody 8,220 ft., Shannon 10,478 ft., Carlisle 12,490 ft., Frontier 12,780 ft.

UTAH WILDCAT FAILURE

Brush Creek, Uintah County: Sun Oil Co. 1 Neil-Govt., NE SW SE 26-4s-22e, 4,297 ft., TD, abnd., Frontier 576 ft., Dakota 952 ft., Morrison 1,000 ft., Curtis 1,873 ft., Entrada 1,990 ft., Carmel 2,240 ft., Navajo 2,348 ft., Chinle 3,140 ft., Shinarump 3,305 ft., Moenkopi 3,420 ft., Phosphoria 4,107 ft. (?), Weber 4,279 ft.

NEBRASKA WILDCAT FAILURE

Sidney area, Cheyenne County: Zeke Lohman et al 1 George, NW NE NE 8-14n-51w, 5,047 ft., TD, abnd., Niobrara 4,048 ft., Timpas 4,336 ft., Codell 4,447 ft., Greenhorn 4,585 ft., Dakota 4,858 ft.

SOUTH LOUISIANA

Pure Well Off St. Mary Parish Looms as an Oiler

NEW ORLEANS—Further tests on Pure Oil Co. A-1 State Lease 832, wildcat off St. Mary Parish, indicate that the well is an oil discovery at 9,620-28 ft. Tests at this depth have recorded a flow of 260 bbl. of oil daily through a $\frac{1}{8}$-in. choke plus 140,000 cu. ft. of gas. Previous test at 10,693-98 ft. credited the well with an estimated daily flow of 1,527,000 cu. ft. of gas plus 21 bbl. of 51.2°-gravity distillate through $\frac{1}{8}$-in. choke. Pressure on the oil flow was 1,165 psi. Operators indicate they will continue testing.

The Texas Co. has discovered oil in the Lottie area of Pointe Coupee Parish which previously produced only gas. The well is the 2 Lottie Land & Development Co., and is credited with a flow of 271 bbl. of 41.8°-gravity oil daily through a 12 64-in. choke. Hole is bottomed at 10,260 ft. in sidetracked hole and production is through perforations at 9,114-22 ft.

Magnolia Petroleum Co. continues to test oil, salt water and gas in the B-1 State Lease 673, in the Eugene Island area, off Terrebonne Parish. Hole is bottomed at 13,880 ft. and is plugged back to 11,000 ft. Through perforations at 10,302-04 ft., the well flowed gas and a good spray of distillate on previous test. Test at 9,816-20 ft. flowed gas-condensate. Operators are preparing to squeeze these perforations and test the sands at 9,516-20 ft. Deeper in the hole, a hot salt-water flow was encountered on drill-stem test at 13,324-29 ft.

Another Eugene Island area wildcat, Magnolia Petroleum Co. A-2 State Lease 693, Block 25, off St. Mary Parish, is drilling below 5,205 ft. in sidetracked hole, and operators are now preparing to core. Test is projected to 10,000 ft.

Floyd L. Karsten has developed a new sand in his Napoleonville extension test, and has shut the well in waiting on test. The 1 Gus J. Labarrow flowed gas and distillate through perforations at 6,040-60 ft., through 7 64-in. choke with 2,300 psi. tubing pressure. Shows of oil were cored from 6,030-6,110 ft.

SOUTH LOUISIANA WILDCAT FAILURES

Acadia Parish: Humble Oil & Refining Co. 1 Mary Klein et al, 43-7s-1w, 1 mi. SW of Trilby and 2½ mi. S-SE of Ritchie production, dry, TD 10,159 ft.

Jefferson Parish: Bateman Drilling Co. 1 N. O. Plantation Co.-State Lease 706, 10-15s-23e, 2 mi. N of Barataria production, dry, TD 11,595 ft.

West Feliciana Parish: Big Chief Drilling Co. and Richard A. Campbell 1 Waller et al, SW NW Twp. 1s-1w, 2 mi. N of Wayside, dry, TD 9,030 ft.

CALIFORNIA

Interest Shifts to 10 Tests In Placerita-Newhall Area

LOS ANGELES.—With the productive area of the Placerita field about drilled up, interest is shifting to some 10 wildcats currently drilling within the Placerita-Newhall area. The most important of these is Humble Oil & Refining Co. 1 N. L. & F. (Newhall Land & Farming Co.). This has been under test for 2 weeks, and a gas sand has been topped at 11,638 ft. and an oil sand at 11,775 ft. Up to this time an initial flow of oil has been obtained but subsequent tests are reported as somewhat disappointing. Location is in Section 23-4n-17w.

The most successful test to date is 1 Phillips of Independent Exploration Co. and Rothschild Oil Co. in Section 6-3n-15w. Apparently a new shallow zone has been discovered. No production tests have been made as yet but two oil sands have been encountered. The top zone, about 100 ft. thick, was topped at 592 ft. The lower zone, topped at 800 ft. still showed oil sand at 975 ft. Present plans call for completing in the lower sand.

In Section 36-4n-16w, T. W. Drilling Co. is rigging pump on their 1 T. W. Placerita. The test is bottomed at 1,565 ft. with 300 ft. of 7-in. perforated pipe landed on bottom. A second test is now rigging in the southeast corner of the same section. This test is 2 T. W. Placerita.

Humble Oil & Refining Co. has finally abandoned a try for an extension to the Paloma field. The test was bottomed at 12,323 ft., and all zones encountered were tight and did not yield commercially. The try was named 2 KCL 41-18 and located in 18-32s-27e.

The 1 National-State of National Steel & Shipbuilding Corp. at Kern Bluff is drilling ahead beyond 4,800 ft. The test is reported ready to be taken over by the Des Moines Oil Co. and renamed 1 Blodget. Location in Section 30-29s-29e.

The Standard Oil Co. Salt Creek test in the Cymric area is expected to be abandoned this week. The test is 76 Anderson, 19-29s-21e, and is bottomed at 2,375 ft. Intervals 2,235-67, 2,239-67, and 2,240-61 ft. were tested with oil-spotted mud recovered. After cleaning to 2,330 ft. the interval 2,245-2,330 ft. was tested. Slightly oily, gassy mud was recovered. The test topped Phacoides at 2,243 ft.

In the Sievert area east of the Edison area, Bena Oil Co. is reported to have logged 300 ft. of gassy sand in its No. 1 well. Depth is beyond 2,000 ft. in Section 27-30s-30e. Approximately 80 acres are now under lease in this area.

H. A. Ivers has begun deepening operations in No. 14 well in the Sespe Forks area of Ventura County. The well has been idle since July 1948 at a depth of 625 ft. The test is now drilling beyond 2,000 ft.

The old well, W-4, originally drilled by W. G. Kreiger in the Wilmington field, 29-4s-13w, is being redrilled and deepened by C. F. Sudduth as No. 8. Original completion was in November 1944 at a depth of 3,700 ft. Present depth is 3,760 ft. with pump being rigged.

CALIFORNIA WILDCAT FAILURES

Fresno County, Tranquility area: Havenstrite Oil Co. 1 Rawn, 23-16s-15e, dry, Kettleman sand 5,685 ft., Big Blue 6,105

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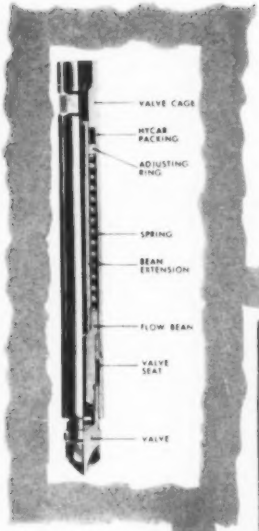
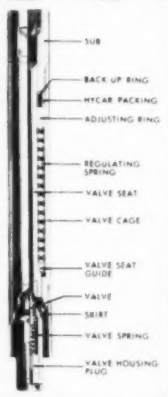
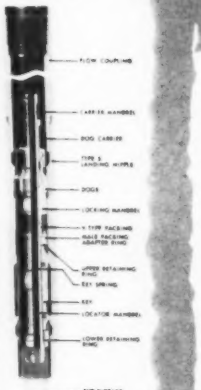


Type D Otis Removable Bottom Hole Regulator.



Type F Otis Removable Tubing Safety Valve.



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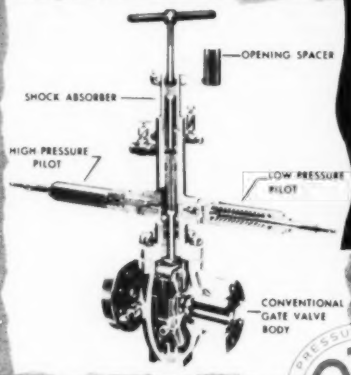

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ft., Marine Temblor 6,520 ft., base lower Varigated 7,035, base basal Temblor 7,595 ft., gun perforated 6,683-6,703 ft. and 6,060-6,100 ft., no entry on test, TD 7,617 ft., elev. 280 ft.

Kern County, Comanche Point area: Lee Ault and Associates 2 Ault, 29-12n-18w, dry, TD 873 ft., elev. 776 ft.

MICHIGAN

Gladwin County Deep Test Proves Noncommercial

MOUNT PLEASANT.—Mogul Oil Co. B-1 Domokos, W½ SW NW 11-18n-1w, Buckeye Township deeper horizon test, Gladwin County, first Richfield - Sylvania wildcat in Buckeye (Dundee) pool, was bottomed out dry in the Sylvania at 5,351 ft. Top of this final zone was picked at 5,160 ft. and not more than a small sand stringer was drilled in this series. Several small noncommercial oil shows were reported from cores in the Richfield but no section of this zone was considered worth testing other than by drill stems, all of which showed water but no good oil recoveries.

Other Gladwin County deeper zone oil test, Superior Oil Co. 1 Kenyon, NE NW SW 12-20n-1w, Butman Township, was jet-perforated with a total of 156 cone shots between 4,874-4,979 ft. but tests resulted in recovery of 4 bbl. of salt water an hour and an oil scum by swabbing. Upper perforations, down to about 4,921 ft., were to be squeeze-cemented to test for good cement job and to allow for retest of the Richfield zone at 4,921-31 ft., which was described by geologists from study of cores and showing some prospect.

On the northeast flank of the developed Bard field, W. L. McClanahan had what appeared to be the best well yet drilled in the pool. His 1-A Schwartz, SW SW SE 31-18n-2w, Grout Township, Gladwin County, filled to flow point from the Dundee in 14 hours after hole was bottomed out in pay at 3,934 ft. It was flowing by heads while tubing was run for acid treatment this week end. Dundee top was logged at 3,884 ft. with oil pay showing at 3,929-34 ft. It was expected that this well would stimulate new drilling activity on the northeast side of the pool early in 1950.

MICHIGAN WILDCAT FAILURES

Bay County, Pinconning Township: Don Rayburn 1 Frick, SW SE NW 29-17n-4e, Dundee 2,897 ft., dry, TD 3,240 ft.

Gladwin County, Buckeye Township: Mogul Oil Co. B-1 Domokos, W½ SW NW 11-18n-1w, Sylvania 5,160 ft., dry, TD 5,351 ft.

Iosco County, Reno Township: Frank E. Roush 1 Longel, NE NW SW 33-22n-5e, Dundee 2,917 ft., dry, TD 3,125 ft.

Livingston County, Howell Township: Panhandle Eastern Pipe Line Co. 1 John Comm., SW NE SE 6-3n-4e, Niagara 4,121 ft., dry, TD 4,139 ft.

Newaygo County, Bridgeton Township: Fisher-McCall Oil & Gas, Inc., 1 Arends, SW NE NW 36-11n-14w, Traverse 2,103 ft., dry, TD 2,131 ft.

St. Clair County, Burtchville Township: Ermerson H. Knack 2 Kopolnick & Kowlachuck, SE NE SW 19-8n-17e, Dundee 693 ft., dry, TD 844 ft.

EASTERN TEXAS

Grayson County Test Has Ellenburger Shows

DALLAS.—The Texas Co. had prospects of an Ellenburger well in northwestern Grayson County, at its 1 John Marshall, A. Tuttle Survey, A-1193. Showings of oil were drilled from 7,856-61 ft., then a drill-stem test at 7,846-54 ft. showed gas in 75 minutes, and in 3 hours recovered 1,275 ft. of clean oil, plus 90 ft. of heavily oil and gas-cut mud. Gravity of the oil was 43.9°.

A second test, open 4 hours, from 7,842-50 ft., had gas in 80 minutes and recovered 1,578 ft. of clean oil plus 90 ft. of heavily oil and gas-cut mud. Flowing pressure on the latter test was 850 psi., and bottom-hole pressure was 3,600 psi. in 20 minutes. Operators ran electrical survey and were waiting on casing.

Denton County gained a new exploration this week as W. W. Wise, of Tyler, filed application to drill a shallow test ¼ mile southeast of Sanger and about 6 miles east of Bolivar field. It is the 1 L. T. Kerby, located 1,700 ft. from north and 2,000 ft. from west lines of lease, and 4,350 ft. from east and 1,650 ft. from south lines of the most easterly south and east lines, H. Tierwester Survey, A-124. The Bolivar field has shown renewed activity recently, with development and extension wells completed. A new location this week, in the Bolivar townsite, was E. B. Fletcher 1 B. Garrison, in the B. P. January Survey, A-658.

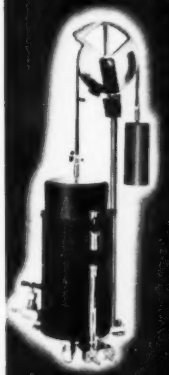
In the new North Lansing field in western Harrison County, Atlantic Refining Co. scheduled its 1 F. L. Landers unit, a confirmation test, 4,900 ft. north of its 1 M. P. Isom, Merchant Survey, discovery well of the field.

In Panola County, Earl Hollandsworth 1 J. T. Green, 11 miles north of Carthage, extended gas-distillate production with a daily potential of some 600 bbl. of 65°-gravity distillate and 16,000,000 cu. ft. of gas daily, open flow. Flowing through ³⁄₈-in. choke, on an earlier test, flowing pressure on tubing was 1,834 psi., and 1,994 psi. on tubing. Total depth was 6,860 ft., with perforations at 6,632-46 ft.

EAST TEXAS (DIST. 5, 6, & 6-P) WILDCAT FAILURES

Navarro County: J. W. Hooser and W. W. Lechner 1 L. M. James, R. D. Newman

GASOMETER
Readable to
.0001
Cu. Ft.



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HOUSTON, TEXAS . . . NEW ORLEANS, LA.

Sur., 9 mi. NE Kerens, dry, TD 3,422 ft., Austin 2,218 ft. by samples.

Smith County: Wm. Hamm, Jr., 1 L. C. House, Hezekiah George Sur., 3 mi. NW Tyler, dry, TD 8,007 ft., elev. 531 ft., base Austin 4,985 ft., top Paluxy 7,612 ft.

Wood County: F. R. Jackson and J. C. Robbins, Jr., 1 Wallace Garrison estate, L. W. Gilliam Sur., 5 mi. SE Winnsboro, dry, TD 6,600 ft. in Paluxy, elev. 599 ft., Austin 4,247 ft., Woodbine 4,667 ft., by samples.

F. R. Jackson et al., 1 G. W. Reed, E. C. Lane Sur., ⅝ mi. NE Pine Mills, dry, TD 6,770 ft. in Woodbine, no shows, elev. 423 ft., Austin 4,937-5,135 ft., by samples.

LA.-ARK.

Rodessa Oiler Brought in In Greenwood Gas Field

SHREVEPORT.—Union Producing Co. 1 Section 13 Unit, 2,325 ft. from north and 2,327 ft. from east lines, 13-17n-12w, in Sligo field of Bossier Parish, was temporarily abandoned last week at 11,317 ft. in salt. According to field reports, the well could not be produced from the Rodessa because of spacing, and although it was thought capable of making some kind of a gas well in the Travis Peak, that possibility was passed up as a probable future development.

In Greenwood gas field of Caddo Parish, Plymouth Oil Co. 1 Thigpen-Herold, 12-17n-16w, boosted its production to make a flowing potential of 30 bbl. of 43°-gravity oil a day, through ¼-in. tubing choke, from perforations at 4,779-4,803 ft. Flowing pressures were 750 psi. on tubing and 300 psi. on casing. Total depth was 6,503 ft., in the Travis Peak, topped at 5,870 ft., plugged back to the Rodessa section at 4,850 ft. Elevation is 197 ft. The well is the first in the field to produce from the Rodessa.

Zack Brooks 1 Nelson, Union Parish wildcat in 29-23n-3w, 4 miles south of Junction City, continued testing through casing perforations at 9,314-24 ft., in the Smackover lime. At last report it was making some 15 bbl. of fluid an hour, being 15 per cent oil.

NORTH LOUISIANA WILDCAT FAILURES

Bossier Parish: Roy L. Reese 1 August Cazoux, 34-20n-11w, dry, TD 2,774 ft., elev. 230 ft., Nacatoch 1,110 ft., base Annona 1,770 ft., base Tokio 2,220 ft., broken Tuscaloosa 2,655-80 ft., with gas on DST.

Winn Parish: D. J. Morgan 1 A. C. Cockerham, NE NE SW 4-11n-2w, dry, TD 1,128 ft. in shale, with streaks of sand, no shows.

ARKANSAS SUCCESSFUL WILDCAT

Columbia County: McAlester Fuel Co. 1-A Phillips-Shocklee, NE SW 33-16s-19w, TD 7,403 ft., perf. Smackover lime 7,394-7,402 ft., flowed 25 bbl. of 62.6°-gravity distillate per day, 9/64-in. choke, FTP 2,300 psi., discovery or extension to Warnock Springs field pending hearing.

ARKANSAS WILDCAT FAILURES

Columbia County: McAlester Fuel Co. 1-A J. G. Wepfer, SW SE 2-16s-20w, dry, TD 3,705 ft., elev. 236 ft., base Annona 2,108 ft., James 3,328-76 ft., Three Finger lime 3,549 ft.

Conway County: C. L. Oblinger 1 Dexter Jackson, SE NE NE 9-6n-17w, dry, TD 1,585 ft., elev. 297 ft.

Nevada County: Pan Am Southern 1 J. L. Beasley, NW SW SW 1-15s-21w, dry, TD 4,004 ft., elev. 396 ft., Nacatoch 1,457 ft., Saratoga 1,778 ft., Annona 2,030 ft., Tokio 2,459 ft., lower Cretaceous 2,572 ft., Massive anhydrite 2,643-2,708 ft., James 3,314 ft., Travis Peak 3,622 ft.

Pike County: Rouse & Moore 1-A J. L. Lee, NW NW SE 31-8s-23w, dry, TD 625 ft.

ILLINOIS

Old Saline County Wildcat Is Showing for Production

MATTOON.—An old wildcat test located just north of the village of Long Branch, 5 miles northwest of Galatie, in northern Saline County, is giving indications of opening a new producing area. It is W. O. Morgan 1 Cole, NE NE SE 20-7s-6e, drilled in 1947, where operators recently have gone back in and reworked the hole, and are retesting the McClosky lime, in which casing has been perforated at 3,118-22 ft. The well is reported to have made a flow estimated at a rate of 90 bbl. an hour. Nearest other production in the Walpole area is about 2 miles to the northeast.

Elk Oil Co. and White River Drilling Co. have a prospective Tar Springs and Cypress producer in their 1 Blazier, NW SW NW 16-7s-9e, located on the west side of the south end of the Herald pool, White County, where other production is mainly from the McClosky, Rosiclare, O'Hara, Aux Vases and Bethel zones. Nearest Tar Springs and Cypress wells are more than 2 miles distant. Testing is now under way in Cypress sand at 2,656-67 ft. Showings also were encountered in the Tar Springs sand at 2,353-62 ft.

Confirming the discovery early in November of production in the area about a

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	Petroleum Industry Consultants, C.A., Caracas, Venez.	
	Denton-Spencer Co. Ltd., Calgary, Alberta, Canada.	

mile southeast of the Ellery pool, 3 miles south of Ellery and 6 miles south of Albion, in Edwards County, The Texas Co. 1 Smith, NE NW SE 31-2s-10e, south offset to the discovery well, swabbed at the rate of 60 bbl. of oil per day while testing the McClosky pay zone at 3,310-12 ft. Total depth is 3,318 ft. with casing at 3,303 ft. The discovery well, The Texas Co. 1 Foster, flowed initially at the rate of 210 bbl. per day from the same zone.

ILLINOIS WILDCAT FAILURE

Saline County: Columbus Exploration Co. 1 DeWees, SE SE NW 24-7s-7e, dry, TD 2,425 ft.

PERMIAN BASIN

Kent County Prospect Logs Additional Pay

MIDLAND.—Kent County's prospective reef limestone discovery, some 8 miles north of the Scurry County reef fields, had logged additional pay at last report. Another Kent County wildcat had set pipe to test in the San Andres.

The Canyon prospect, Chapman & McFarland 1 D. M. Cogdell, 467 ft. out of the southwest corner of 716-97-H&TC, topped the reef at 6,796 ft., on elevation of 2,421 ft., derrick floor. First drill-stem test from 6,796-6,819 ft. recovered a total of 900 ft. of fluid, being 186 ft. of free 39.8°-gravity oil, and 714 ft. of oil-cut mud estimated to be 50 per cent oil. Shut-in bottom-hole pressure was 2,725 psi. in 15 minutes. Length of test was 1½ hours.

The second test, open 3 hours from 6,799-6,839 ft., had gas in 10 minutes, estimated at 400,000 cu. ft. of gas daily. The pipe filled up to 4,226 ft. with oil at an estimated rate of 57 bbl. of oil an hour, then unloaded. There was no formation water. Flowing pressure was 200-600 psi. Shut-in pressure was 2,300 psi. in 15 minutes. At last report total depth was 6,839 ft., and operators were running 7-in. casing to 6,800 ft.

In Southwest Kent County, Drilling & Exploration Co., Inc., 1 Connell, NE NE 19-5-H&GN, 2 miles southeast of Polar and 3 miles southeast of Ellenburger production in the Polar field, developed salt water on a drill-stem test of the Canyon lime. At last report it had total depth at 7,057 ft., and was preparing to drill ahead to the Strawn.

Top of the reef in the 1 Connell was 7,004 ft., minus 4,633 ft., and drill samples showed oil stains and odor to 7,021 ft. A 1½-hour drill-stem test from 6,999-7,021 ft. recovered 450 ft. of drilling mud. A second test from 7,040-54 ft. failed mechanically, and a third test from 7,014-57 ft., open 1½ hours, produced a fair blow and recovered 120 ft. of drilling mud, 60 ft. of slightly gas-cut mud and 490 ft. of salt water.

About 1 mile northwest of Drilling & Exploration's 1 Connell, George S. Anderson of Fort Worth and W. R. Childers of Hobbs, N. M., 1 Cargile, SE SE NE 23-5-H&GN, 1 mile southeast of Polar, set 5½-in. casing at 2,345 ft., top of the indicated San Andres pay. The well entered the soft, oil-saturated zone at 2,345 ft., then drilled to 2,361 ft. and came out of the hole to set pipe without making a test. Plans were to move in cable tools to drill cement plug and test.

In Scurry County, 5 miles northeast of Snyder, M. E. Davis and others 1-A John J. Schattel, NW NW 90-2-H&TC, was drilling plug from 5½-in. casing set on bottom at 7,781 ft. It was to perforate and test in the Ellenburger, topped at 7,750 ft. Elevation is 2,459 ft. The well had recovered 600 ft. of free oil on a 1-hour drill-stem test from 7,750-71 ft.

Eleven miles east of Snyder, R. W. Baxter 1 D. D. Feldman, 63-3-H&TC, completed for 121.4 bbl. of 42°-gravity oil a day, with no water, from perforations in the Ellenburger at 7,310-40 ft. On elevation of 2,257 ft., the well had top of the reef at 5,980 ft., Strawn 6,880 ft., and Ellenburger at 7,310 ft. Total depth was 7,567 ft.

In southwestern Borden County, Amerada Petroleum Corp. 1 Von Roeder, SE SW 103-25-H&TC, was testing through ¼-in. tubing choke after perforating in the reef from 7,100-10 ft. The section was acidized with 500 gal. and swabbed, after which it kicked off and flowed 158.4 bbl. of oil, plus 25 bbl. of sediment and 9 bbl. of water in 6 hours and 40 minutes.

Eight miles north of the Good field, Borden County, R. S. Brennand, Jr., 1 W. D. Everett, 9,500-ft. Ellenburger wildcat, topped a hard, cherty lime at 8,488 ft., which was thought to be Mississippian. It was drilling ahead in lime and chert at 8,520 ft.

Four miles west of Gail, Don Amerine and others 1 Clayton & Johnson was drilling below 9,475 ft. in Mississippian lime and shale. A 1-hour drill-stem test from 9,388-9,408 ft. recovered 100 ft. of mud.

Runnels County, which has experienced considerable exploration over the past few months, with heavy leasing reported for almost the entire northern half, completed another discovery or extension well this week at N. P. Powell 1 Mrs. Sallie Odom, Section 286, G. Carroll Survey, and 1½ miles southeast of Humble Oil & Refining Co. 1 Odom, Strawn discovery of the Fort Chadbourne field, and 5½ miles west of Wingate.

Completion potential was 1,820 bbl. of oil a day, based on a 6-hour test through 12/16-in. choke, which produced 455 bbl. of oil. Perforations in the Strawn were from 5,311-31 ft. Flowing pressures were 1,000 psi. on casing and 300 psi. on tubing. Gas-oil ratio was 600 cu. ft. Location is 330 ft. from north and west lines of the section, on a 320-acre lease farmed out by T. W. Murray of Texarkana, who retained an overriding.

Application was made by the same operator to drill the 2 Odom, located 330 ft. from north and 1,400 ft. from west lines of Section 286, of the same survey, and 1,070 ft. east of the 1 Odom.

Powell's 1 Vick, N. Smithwick Survey 452, prepared to drill plug from 5½-in. casing set at 5,080 ft., and test the Strawn from open hole to 5,240 ft., total depth.

Delaware Drillers, Inc., and others 1 Odom, Section 291, G. Carroll Survey, was waiting on storage before testing. Total depth was 5,293 ft., with casing set at 5,279 ft.

WEST TEXAS (DISTRICTS 8 AND 7-C) SUCCESSFUL WILDCATS

Runnels County: Drilling & Exploration Co., Inc., 1 W. R. Gross, Sec. 93½, S. Herring Sur., 7½ mi. N Miles, TD 4,310 ft., PB 3,992 ft., elevation 1,806 ft., top Palo Pinto pay 3,934 ft., IP pumped 7.7 bbl. of 42°-gravity oil a day, 2 bbl. wate, GOR 200 cu. ft.

Tom Green County: Hiawatha Oil & Gas Co. 1 W. G. Currie, NW SW 19-25-H&TC, 2 mi. S Susan Peak field, TD 4,881 ft., drilled out to 4,875 ft., elevation 2,234 ft., top Canyon 4,400 ft., Strawn 4,835 ft., perforated 4,835-78 ft., IP flowed 111.6 bbl. 37°-gravity oil a day, ¼-in. choke, TP 150 psi., GOR 815 cu. ft.

WEST TEXAS (DISTRICTS 8 AND 7-C) WILDCAT FAILURES

Dickens County: Union Oil Co. of California 1 W. J. Elliott, Jr., 177-1-H&GN, 5½ mi. SW Spur, dry, TD 8,117 ft., elevation 2,509 ft., San Angelo 2,185 ft., Clear Fork 2,405 ft., Tubb sand 2,805 ft., Noodle Creek 4,845 ft., Ellenburger 8,046 ft., pre-Cambrian 8,115 ft., no shows.

Reagan County: York & Harper, Inc., 1 J. D. Sugg, NW NW 104-2-T&P, NE corner of county, dry, TD 10,170 ft., elevation 2,616 ft., Yates 1,385 ft., San Angelo 3,040 ft., Strawn 9,305 ft., Ellenburger 9,935 ft.

Runnels County: Nelson Bunker Hunt 1 G. A. Gully, Sec. 113, D. Letsch Sur., 5½ mi. SW Ballinger, dry, TD 4,764 ft., elevation 1,710 ft., Palo Pinto 3,450 ft., Capps 3,780 ft., Ellenburger 4,422 ft.

SOUTHEASTERN NEW MEXICO

HOBBS.—Atlantic Refining Co. completed its 1-A Dickenson, NW NW 13-15s-37e, as a Mississippian lime discovery, some 10 miles west of the Wasson area in Yoakum County, Texas, and the same distance north and slightly west of Knowles Devonian field.

Initial potential was 350 bbl. of 42°-gravity oil a day, through ¾-in. choke, from perforations at intervals from 11,272-324 ft. Tubing pressure was 290 psi. and gas-oil ratio was 142 cu. ft. An earlier gage produced 228 bbl. of oil in 8 hours through ¾-in. bottom choke, containing 3 per cent basic sediment and drilling water, from perforations at 11,260-318 ft. Total depth was 11,325 ft. Elevation was 3,792 ft., and operators' top on the Mississippian was 11,200 ft.

The 1-A Dickenson is two locations southeast of McAlester Fuel Co.'s discovery of the Denton, Pennsylvanian and Devonian field.

TEXAS GULF COAST

High Water Shuts Down Hardin County Wildcat

HOUSTON.—Two miles southwest of Kountze in Hardin County, General Crude Oil Co. et al 1 Ester Hooks et al is shut down because of high water at 8,440 ft. The wildcat recovered gas and 10 gal. of condensate on 20-minute drill-stem test through open hole at 7,075-145 ft. Estimated gravity was 52°, and bottom-hole flowing pressure was 3,275 psi. The prospective discovery is in the J. D. Knight Sur., Abstract 353.

The Texas Co. is drilling below 9,090 ft. in the 1 W. O. Bartle, Harris County wildcat in the William White Survey, Abstract 829, 6 miles northeast of Tomball. A 16-minute drill-stem test at 5,535-37 ft. recovered 120 ft. gas-cut mud and sand, with no shows of oil. Bottom-hole flowing pressure was 1,050 psi.

Humble Oil & Refining Co. continues to test the B-1 Mentor Northington et al, Wharton County wildcat in the Andrew Rabb Survey, Abstract 53, 3½ miles northeast of Eldridge in the Bonus area. On drill-stem test at 10,155-65 ft. recovery was 2,500 ft. of water cushion and 270 ft. of gas-cut mud. Operators are now preparing to squeeze off perforations and will attempt to break down the formation.

Magnolia Petroleum Co. is preparing to rerun log on the 1 Joe Vitel, after the first attempt failed. Test is approximately 1 mile southwest of McDowell townsite, just off the west side of the San Felipe dome. Hole is bottomed at 8,148 ft. In the original hole operators tested some 21.7°-gravity oil on a drill-stem test at 8,146-51 ft. Operators lost drill collars in the hole and then plugged back in order to sidetrack to present depth.

TEXAS GULF COAST (DISTRICTS 2 AND 3) SUCCESSFUL WILDCAT

Liberty County: New pay at Hull—John W. Mecon D-1 Merchant, H&TC RR Sur. 194, ¾ mi. SW of Hull, and ½ mi. NW of Hull field production, dual completion, TD 9,068 ft., top pay 8,002 ft., perf. 8,002-10 ft., IP: 258 bbl. oil, 8-in. choke, GOR 635, CP 1,875 psi., 30.6°-gravity; top pay 8,170 ft., perf. 8,170-78 ft., IP: 200 bbl. oil, ⅛-in. choke, TP 1,925 psi., 30.4°-gravity, GOR 750.

TEXAS GULF COAST (DISTRICTS 2 AND 3) WILDCAT FAILURES

Calhoun County: Mangum - Dunwoody 1 Mrs. Maude B. Taylor, Phillip Dimitt Sur., A-11, 10 mi. E-NE of Port Lavaca, dry, TD 8,320 ft.

Hardin County: Warren & Burdett, Inc., Humble Oil & Refining Co. and John Mayo 1 Teel Estate, Thompson C. Gaines Sur., A-23, 3 mi. S of Saratoga, dry, TD 3,807 ft.

Harris County: The Sparta Oil Co. 1 Glen R. Fry, H&TC RR Sur. 41, Block 2, 3 mi. NW of Barker, dry, TD 7,781 ft.

Jackson County: Pat R. Rutherford 1 Edward C. Thomas et al, Lot 71, Block 4, Schwind & Mahers Subd. Ward Farms, Maria de Jesus Leal Gr., A-345, dry, TD 7,147 ft.

Jefferson County: S. A. Brewster and W. O. Bartle 2 L. Mays et al, Daniel Easley League, 3 mi. NW of Amelia, dry, TD 6,600 ft.

Liberty County: McCarthy Oil & Gas Corp. 1 J. T. Hooks, H&TC RR Co. Co. Sur., A-246, 5 mi. NE of Hankamer, dry, TD 8,020 ft.

San Jacinto County: Butcher-Arthur, Inc., and Daugherty & Kidd 1 First National Bank of Cleveland, Frederick Pelzer Sur., A-244, 7 mi. NW of Cleveland, 1 mi. NW of Mercy field, dry, TD 6,506 ft.

Washington County: Alaska Steamship Co. et al 1 Ida Rosenbaum, Nestor Clay Sur., A-29, 12 mi. N of Brenham, dry, TD 3,821 ft.

CANADIAN FIELDS

Thick Devonian Pay Found By Gulf Well at Stettler

CALGARY—Canadian Gulf Oil Co. has found about twice the thickness of Devonian D2 oil pay at one of its Stettler follow-ups near the D2 and D3 zone discovery well completed last April. The new assured success is Gulf 6, N. J. Ellis, LSD 6, 10-38-20w4, located about $^3/_8$ miles northeast of the 4 Ellis discovery well. No. 6 has found about 74 ft. of D2 zone to date, all yielding oil and gas on drill-stem tests, and has not yet found base of the pay.

D2 zone at No. 6 was topped at 5,092 or 2,345 ft. subsea. This is believed to be approximately the same elevation of D2 as found at the discovery well.

Details of three drill-stem tests run in the D2 are as follows: interval 5,182-5,207 ft., 30 minutes in duration, recovered 2,450 ft. of oil and received a natural-gas flow of 200,000 cu. ft. daily diminishing to 100,000 cu. ft. daily after 20 minutes; interval 5,210-27 ft., 75 minutes in duration, recovered 2,750 ft. of oil and received a natural-gas flow rate of 250,000 cu. ft. daily; interval 5,246-61 ft., 1 hour duration, received a gas flow to the surface 17 minutes after tester was opened, plus a pipe recovery of 4,050 ft. of oil and a gas-flow rate measured at 60,000 cu. ft. daily. Gravity of the D2 oil has been estimated at 32° A.P.I.

Hole is now bottomed at 5,271 ft., still in D2, and crew is preparing to run a further drill-stem test. Coring and testing will continue in this horizon until it has been fully penetrated and then crew will proceed in search of D3.

Meanwhile, Gulf has two other wells drilling in this area. Gulf-C. P. R. 13 Ellis, LSD 13, 3-38-20w4, $^1/_4$ mile south of the discovery, has just completed a fishing job and is drilling in shale at 5,124 ft. Gulf 14, H. W. Kerridge, LSD 14, 14-37-20w4, about $4^1/_2$ miles south-southeast of the discovery, was spudded December 21 and is making hole below 400 ft.

The 1 Cardiff-Giant, LSD 9, 26-55-26w4, in the Cardiff area about 13 miles north of Edmonton, continues to get encouragement in the Cretaceous. Drill-stem test of Lower Cretaceous interval 3,589-3,600 ft. has given a natural-gas flow rate of 300,000 cu. ft. daily, plus pipe recovery of 10 ft. of oil and gas-cut mud. The well is now drilling at 3,793 ft.

Drilled by the Cardiff-Edmonton Oil Syndicate on a 5,600-acre farmout from Imperial Oil, Ltd., the wildcat has shown natural gas on three drill-stem tests to date. First test was of the Viking sand interval 2,807-16 ft., giving gas at rate of 1,500,000 cu. ft. daily. Second was of Lower Cretaceous with bottom at 3,582 ft. This gave gas at rate of 2,250,000 cu. ft. daily.

CANADIAN WILDCAT FAILURES

1 Okalta-Stony Plain, LSD 5, 29-52-27w4, TD 6,464 ft.

4 Gulf A. Aloisio, LSD 4, 5-62-24w4, TD 4,834 ft.

APPALACHIAN FIELD

United Fuel Gas Co. Stakes New Wildcat

PITTSBURGH—A wildcat location has been made in Tucker district, Wirt County, West Virginia, by United Fuel Gas Co. It is the 6549 S. O. Toncray, elevation 836 ft., on the Belleville Quadrangle 2.95 miles south of Lat. 39° 05 minutes and 3.40 miles west of Long. 81° 30 minutes. In this section, but in Steele district, Wood County, Columbian Carbon Co. 1139 Augusta Carson Radcliffe et al, elevation 846 ft., is fishing at 1,900 ft. Two other deep well fishing jobs are in progress: Dry Fork district, Tucker County, Cumberland & Allegheny Gas Co. 1-A-425 Jason Harman, elevation 3,304 ft., at 7,662 ft. due to blow out; Portland district, Preston County, Snee & Eberly 2 Cora E. Lewis, elevation 1,953 ft., at 5,045 ft. In Pocatalico district, Putnam County, Godfrey L. Cabot, Inc. 1306 J. L. McLean heirs, elevation 947 ft., is drilling at 5,050 ft. in the Oriskany sand, topped at 5,048 ft.

In Wharton Township, Fayette County, Pennsylvania, William E. Snee et al 3 Indian Creek Coal & Coke Co. finished running 7-in. casing and is now splicing the wire line, and in Georges Township,

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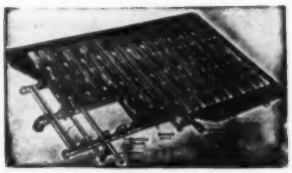

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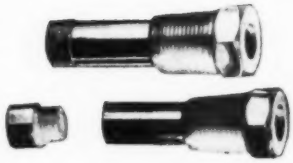

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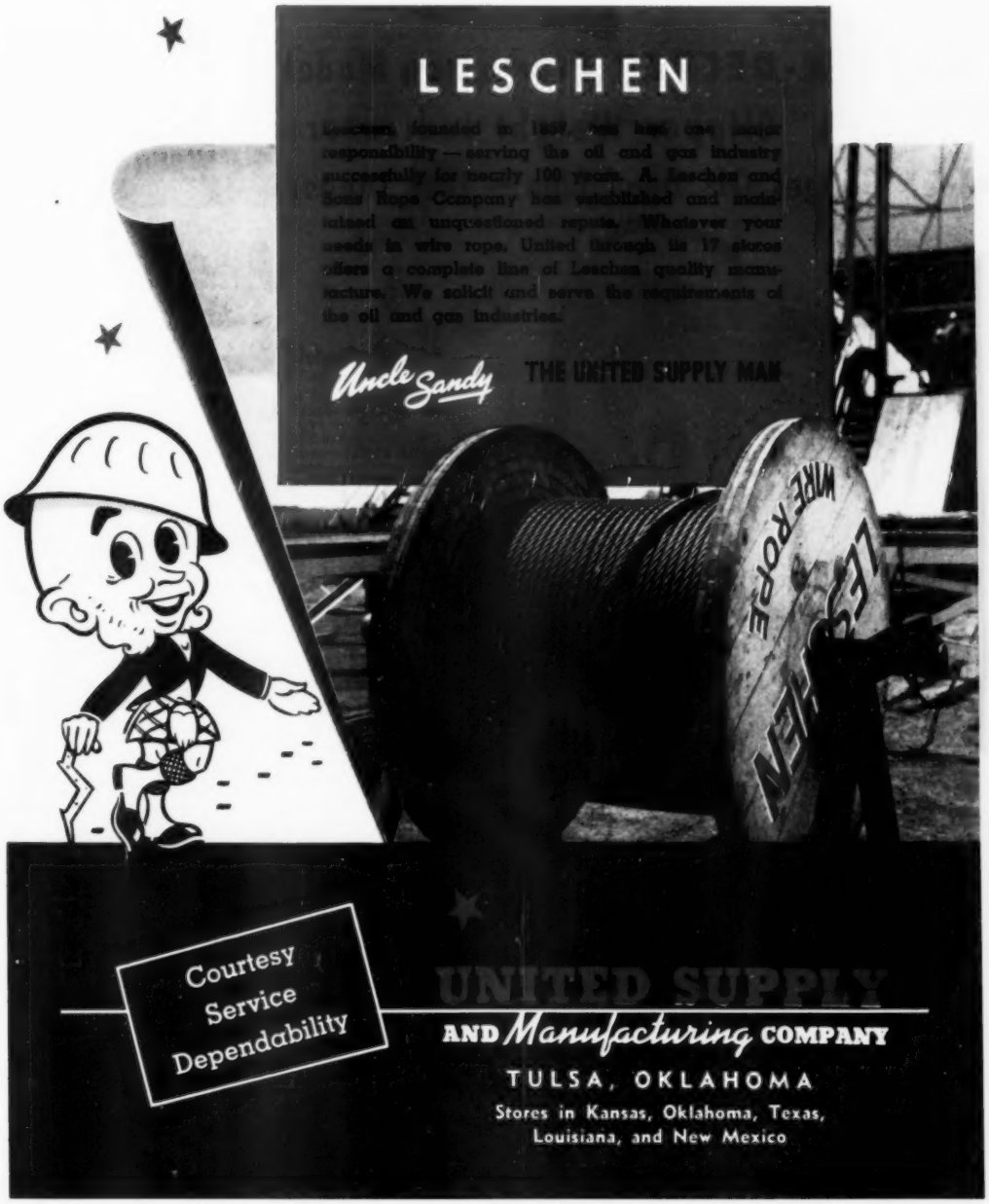
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Back view showing "Sealtite" construction and Hi-Pressure Hose

The Portable Model

14" x 17" x 12"

So compact that it can be easily moved from rig to rig. Comes with handles on top and two-inch pipe collar in bottom. It is installed on a post in front of the drawworks for maximum convenience. Can be mounted permanently on mast or derrick if desired.

A Martin-Decker Production Model Weight Indicator Gauge can be placed anywhere you want it—at the brake, in front of the driller, over next to the line permanently attached to the mast where it can be **seen** by the driller—without danger of damage from dead line vibration or whip, and with it you can read your loads with precision in pounds. Equipped with supersensitive Vernier for maximum sensitivity and readability. Vacuum loaded at the factory and permanently sealed. Easy to install and move. No adjusting, no pumping up. Write for descriptive literature!

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The Clipper "Sealtite" above is permanently installed on a Hopper Blitz trailer-mounted rig. Lowering the mast and moving in no way interferes with this installation.

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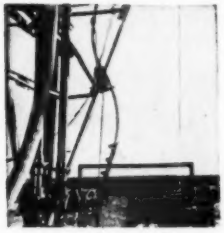

This unretouched photo of dead line whip above was made on a well in West Texas and forcibly illustrates the sort of service to which the Toolpusher or Unit Type Weight Indicator is subjected. Only the rugged diaphragm of the Production Model Clipper "Sealtite" is subjected to dead line vibration and whip as the Gauge is safely installed in the steel box at the driller's position.

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Orville Eberly et al 1 N. E. Murphy is drilling at 6,446 ft. In Napier Township, Bedford County, South Penn et al, Snee & Eberly 1 Jesse B. Miller is drilling at 5,578 ft.

OHIO, KENTUCKY

Putnam Drilling On Second Test

COLUMBUS.—B. H. Putnam et al are drilling a second wildcat in Troy Township, Athens County. The new venture is on R. Murray in Section 13, 2 miles southwest of their 1 Griffin. The operator has drilled a number of Berea sand wells in Olive Township, Meigs County, on wide spacing, using multiple shots to increase the open flow to make fair gas wells.

Stone Creek Brick Co.'s (A. C. Marsh) wildcats in Jefferson and York townships in Tuscarawas County have both reached the Oriskany horizon without reporting any shows, and are now drilling on to test the Clinton sand.

Preston Oil 1 Carl Harris, Section 19, Jackson Township, Knox County, logged the Clinton at 2,952-80 ft. and in 24 hours after shot made 25 bbl.

OHIO SUCCESSFUL WILDCAT

Erie County, Oxford Township: Centennial Enterprise, Inc., 1 W. Mack, Lot 221, Trenton 2,420-2,994 ft., 3 bbl., TD 2,965 ft.

EASTERN KENTUCKY

ASHLAND.—In Furnace (deep) gas field of southern Powell County and northern Estill County a recent completion is that of Petroleum Exploration, Inc., at 1 Claude Newkirk, 21-P-68 Estill County. Topping objective St. Peter sand at 2,570 ft., operators had a total of 180,000 cu. ft. of gas daily to total depth 2,641 ft. After 80-qt. shot of solidified nitroglycerin, well gaged 340,000 cu. ft. daily with rock pressure of 700 lb.

In same field but to the northeast of the above test, Jack Kindred has made location for 2 George Lyle in 25-P-69.

In Johnson County 19-R-79, Ashland Oil & Refining Co. 8 Wallace Williams is shut down at 5,684 ft. with bad fishing job. Very little hole has been made at this important wildcat in the past few months.

WESTERN KENTUCKY

OWENSBORO.—Opening a new Salem lime pool, the first in this deeper zone in Ohio County, S. W. Bardill 1 Chester Tichnor, NE NE NE 7-L-31, has been completed pumping 7 bbl. of oil daily. Pay is at 1,484-1,593 ft. with bottom of the hole at 1,593 ft. Previous deepest production of other pools in the county has been from McClosky lime, about 200 to 250 ft. shallower. The new pool is about 3 miles southeast of the Jolly pool. Drilling has been started at 1 Bilbo, SE NE NE 7-L-31, about 2,000 ft. south of the discovery well.

Discovery of another new pool in southwestern Henderson County is indicated at Cherry & Kidd 1 Wilson, C S½ 8-O-22, which recovered 60 ft. of clean oil with 60 ft. of mud-cut oil and 30 ft. of oil-cut mud in a drill-stem test of Cypress sand at 2,179-89 ft. Casing has been run to 2,175 ft. The discovery is a few miles south of Corydon and northwest of production in the Dixie area.

WESTERN KENTUCKY SUCCESSFUL WILDCAT

Ohio County: S. W. Bardill 1 Chester Tichnor, NE NE NE 7-1-31, IP 7 bbl., Salem lime 1,484-1,510 ft., TD 1,593 ft.

INDIANA

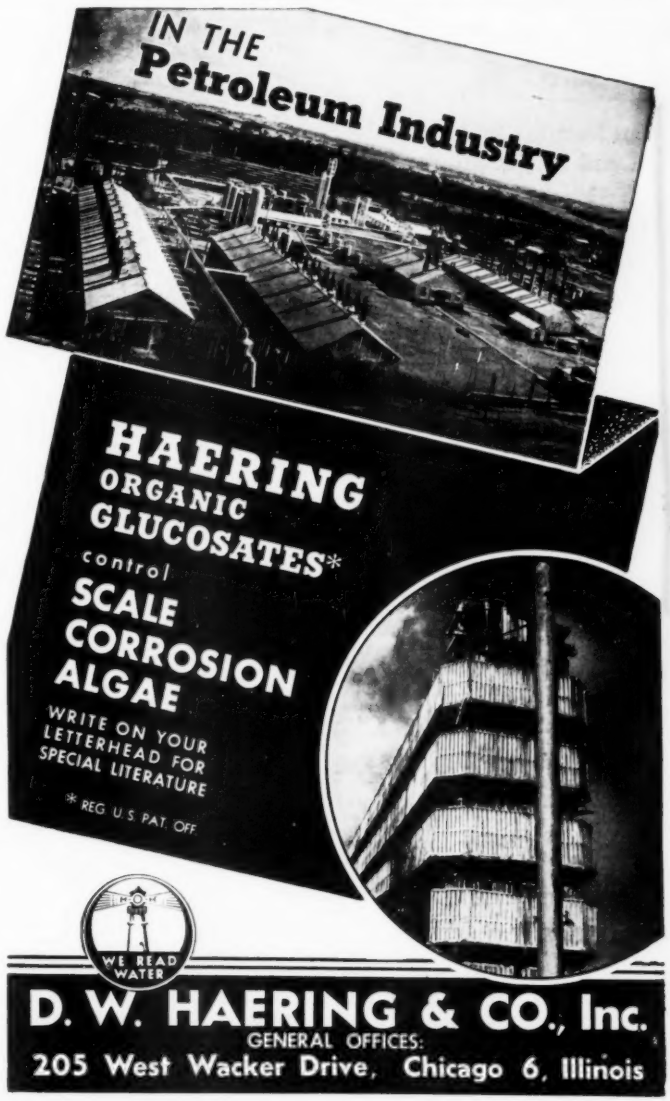
EVANSVILLE.—The new area just north of Plainville in Gibson County is showing additional promise of becoming a good oil and gas field. The discovery well, National Associated Petroleum Co. 1 L. Meuer, SE SW NE 2-4n-7w, completed last week in McClosky lime, encountered at the relatively shallow depth of 750 ft., continues to flow better than 200 bbl. daily. It has 9 ft. of saturation at 732-41 ft. The second well, 1-A Meuer, a "twin" to the the discovery well, is being completed as a gas well, estimated good for 3,000,000 cu. ft. per day, from Salem lime found at 1,157-72 ft. (total depth 1,192 ft.) to give the area two pay zones. Estimated bottom-hole pressure is 1,000 psi.

In the meantime, a third well, 1 Earl Meuer, NW SW NE 2-4n-7w, a northwest diagonal 10-acre offset to the discovery producer, has found saturation in the McClosky at a total depth of 747 ft., and, with casing run to the top, is in process of testing. Drilling already is under way by Freeman Lomelino at 1 Killion, SE NW NW 1-4n-7w, a half mile northeast, and by A. C. Burger at 1 Foust, SE SW SE 35-5n-7w, a half mile north of the discovery.

The discovery is in an almost virgin area more than 12 miles from any other production.

A new pay zone, the Aux Vases sand, for the area south of Owensville, Gibson County, is being opened by C. E. O'Neal at his 2 Curtis Garwood, SW NE SE 25-3s-12w. In a drill-stem test of this sand, found at 2,450-66 ft., the well had gas at the surface within 6 minutes after the tool was opened, and started flowing oil within 22 minutes. Flow was estimated good for 75 to 100 bbl. per hour. Casing has been run to 2,444 ft. The location is 3 miles south of the town of Owensville.

Ashland Oil & Refining Co. and associates 1 Helm-Powell, NW NW SW 23-6s-8w, south offset to the recently completed discovery well (V-T Drilling Co. 1 Tom



Helm) and first confirmation test for the Pelser pool, 5 miles south of Boonville, Warrick County, swabbed at the rate of 3½ bbl. of oil and ½ bbl. of water per hour while testing the pool's Cypress sand pay zone at 1,595-97 ft., and is being put on the pump. In the meantime, V-T Drilling Co. and associates 1 Helm-Stith, NW SW NW 23-6s-8w, north offset to the discovery well, has found saturation in the sand at 1,544-57 ft., and is preparing to test with casing at 1,539 ft.

INDIANA SUCCESSFUL WILDCAT

Posey County: C. E. Skiles 1 Meier, SE NE SW 7-6s-12w, IP 122 bbl., Mansfield 1,120-40 ft., TD 1,140 ft. (Extension to Bufkin pool).

INDIANA WILDCAT FAILURES

Daviess County: Dome-Minnick Oil Co. 1 Dougherty, SW SW SW 3-5n-6w, dry, TD 1,320 ft.

Knox County: Messmer Oil Co. 1 Scott-Gognat, SE NE SE 10-4n-9w, dry, TD 1,497 ft.

OKLAHOMA

Bartlesville Sand Pool Found in Lincoln County

FALCON-SEABOARD DRILLING CO. appears to have found another Bartlesville sand pool in Lincoln County where its 1 Strader, SE NW SE 8-13n-3e, south of Warrick and 3 miles from nearest other production, flowed at an estimated rate of 15 to 20 bbl. of oil per hour in a drill-stem test.

Bartlesville sand was topped at 4,685 ft., and an interval at 4,688-95 ft. was tested with the testing tool open 30 minutes. Gas showed at the surface within 3 minutes and oil started flowing 7 minutes later. Casing was run to the bottom of the hole at 4,695 ft. and will be perforated at 4,687-92 ft.

Previously, the well also had encountered promising showings in Oswego lime, topped at 4,232 ft., and in which a drill-stem test was made at 4,238-70 ft. The test, lasting 60 minutes, showed gas in 40 minutes and resulted in a recovery of 1,000 ft. of oil and gas-cut mud, along with a small amount of free oil.

Gulf Coast Western Oil Co. 1 Rose, NE SW SW 10-10n-4e, a prospective pool-opener in Pottawatomie County, swabbed 76 bbl. of oil and 96 bbl. of water in 24 hours while testing Wilcox sand, open at 5,502-27 ft., and is being put on the pump. Sand was topped at 5,504 ft. The well is 3 miles northeast of Shawnee and about 2 miles southeast of production in the Shawnee pool.

A new pay zone, the Simpson sand, has been opened in the Southeast New Hope pool, Garvin County, Sinclair Oil & Gas Co. 4 Chrystal Jones, C NE SE 10-4n-3w, flowed 96 bbl. of 41.6° oil in 24 hours through ¾-in. choke from this formation. Casing was perforated at 7,970-95 ft., with top of the Bromide at 7,947 ft. Hole had been drilled to 9,035 ft. but was plugged back to 8,045 ft. in casing, cemented at 8,109 ft.

Proving first Hunton lime oil production for the Southeast Bebee area in Pontotoc County, W. A. Delaney, Jr., 1 Bray, SW SW NE 4-4n-5e, flowed 22 bbl. per hour through 2½-in. tubing from this zone after acidizing. Production is from casing perforations at 2,065-78 ft. in the top of the Hunton. Hole had been drilled to 2,456 ft. in Viola lime, the main productive horizon of the field, which failed to produce. The well, located ½ mile east of the Bebee townsite and about ¼ mile northwest of production, is about 1½ miles northwest of a recently completed Hunton lime gas well, the only other production from this zone in the area. Calvin sand, the field's other productive horizon, was topped at 1,493 ft., but also was unproductive.

OKLAHOMA SUCCESSFUL WILDCATS

Kay County: Morgan 1 Kales, N 2 NE SW 20-27n-4e, flowed 1,000,000 cu. ft. of gas and 10 bbl. of oil from Bartlesville at 3,196-3,236 ft., TD 3,238 ft.

Lincoln County: Brauer et al 1 Sowards, NW NW NE 19-14n-6e, pumped 6 bbl. of oil from Prue at 3,306-3,419 ft., TD 3,425 ft.

Major County: Mazda Oil Co. 1 Black, NE NW NW 12-21n-10w, flowed 219 bbl. of oil from Manning at 6,804-86 ft., TD 6,945 ft.

Okmulgee County: Seismograph Service Corp. 1 Gooden, SW NW SW 7-14n-11e, flowed 204 bbl. of 31°-gravity oil from Dutcher at 2,553-66 ft., TD 2,578 ft.

OKLAHOMA WILDCAT FAILURES

Carter County: Samedan 1 Wade, SW SW SW 1-4s-3w, dry, TD 2,914 ft., basal Pennsylvanian-McLish 2,672 ft., Oil Creek 2,780 ft., lime 2,845 ft., and 2,870 ft.

Cotton County: Hutcheson 2 Larse, SW SW SW 33-3s-12w, dry, TD 4,625 ft.

Kolp 1 Cox, NW SE SE 33-4s-13w, dry, TD 1,979 ft., sand 1,251 ft., and 1,327 ft., broken sand 1,405 ft., sand 1,512 ft. and 1,582 ft., sand and lime 1,654 ft., sand 1,662 ft., 1,739 ft., 1,851 ft., 1,882 ft., 1,894 ft., and 1,909 ft.

Creek County: Hoxsey 1 Clegg, SE SE SE 24-19n-8e, dry, TD 1,650 ft., sandy shale 1,567 ft.

Garvin County: Texas 1 Bowie, SE NW NE 4-3n-1e, dry, TD 4,590 ft., sand 3,945 ft., second Bromide sand 4,335 ft., Tulip Creek 4,430 ft.

Hiskett & Hatch 1 Bolling, SW SW SW 23-1n-1w, dry, TD 608 ft.

Grady County: Sunray 1 Wood, SE SE SW 1-4n-8w, dry, TD 10,196 ft., Garner 5,570 ft., upper Rowe sand 5,983 ft., Rowe lime 6,390 ft., Hoxbar 6,750 ft., Nyles 6,765 ft., first oolitic 7,068 ft., ostracod 7,156 ft., Wade series 7,400 ft., dense 8,350 ft., Glover 8,505 ft., Charleston 8,855 ft., Pooler 9,395 ft., lower Pooler 9,738 ft. (Geological test.)

Kiowa County: Sellers 1 Vera Mace, SE SE SE 14-6n-14w, dry, TD 494 ft.

Lincoln County: Crosbie 1 Case, SW SE SE 12-12n-6e, dry, TD 4,285 ft., Inola 3,507 ft., Hogshooter 1,615 ft., Checkerboard 2,000 ft., Oswego 2,880 ft., Prue 2,955 ft., Skinner 3,100 ft., lime 3,315 ft., Red Fork 3,355 ft., lime 3,660 ft., Booch 3,732 ft., Gilcrease 3,770 ft., Pitkin 3,805 ft., Caney 3,860 ft., Mayes 4,115 ft., Woodford 4,218 ft., Hunton 4,243 ft.

Warren 1 Goff, SE NE SE 23-14n-6e, dry, TD 3,067 ft.

Eason 1 Gardner, SW SW NW 31-15n-2e, dry, TD 5,445 ft.

McIntosh County: Mid-Continent 1 Dorsey, C SW NE 12-9n-13e, dry, TD 4,365 ft., Hartshorne 1,761 ft., Gilcrease 2,436 ft., Wapanucka 3,114 ft., Union Valley 3,327 ft., Cornwell 3,387 ft., Misener-Hunton 4,070 ft., Sylvan 4,194 ft., Viola 4,257 ft., Wilcox 4,316 ft.

Okfuskee County: Nye 1 Woods, NW SW NE 21-12n-10e, dry, TD 3,070 ft., Bartlesville 2,323 ft., lime 2,460 ft., Booch 2,516 ft., no Gilcrease, Union Valley-Cromwell 3,037 ft.

Osage County: McCurdy et al 1 Osoge, SE SE SW 13-27n-9e, dry, TD 2,423 ft.

Payne County: Trigg Drilling 1 Phelps, NW NW SE 20-19n-1e, dry, TD 5,080 ft.

Pittsburg County: British-American 1 Mitchell, SW SW NW 4-5n-14e, dry, TD 948 ft.

Pottawatomie County: Sadler et al 1 Longaker, SW NW NW 5-9n-5e, dry, TD 4,412 ft., Hogshooter 2,210 ft., Checkerobard 2,540 ft., upper Wewoka 2,754 ft., lower Wewoka 3,179 ft., Calvin 3,412 ft., basal Pennsylvanian-Mississippi lime 4,010 ft., Hunton 4,224 ft., Sylvan 4,239 ft.

Seminole County: Konawa 1 Anderson,

LEGAL

U. S. DEPARTMENT OF THE INTERIOR, Bureau of Land Management, Washington 25, D. C. Notice is hereby given that the lands listed herein are offered through sealed bids on the terms hereinafter specified, to qualified bidders of the highest cash amounts per acre as a bonus for the privilege of leasing the lands under sec. 17 of the Leasing Act of February 25, 1920 (41 Stat. 437; 30 U.S.C. sec. 181), as amended. All bids must be submitted to the Director, Bureau of Land Management, Washington 25, D.C., on or before 1 p.m. of the date set out herein. Each bidder must submit with the bid one-fifth of the amount bid in cash or by certified check on a solvent bank or by money order made payable to the order of the Treasurer of the United States, and file the showing of qualifications to receive a lease required under 43 CFR 192.42 (a) (2), and (a) (3), Circular 1730. The envelopes should be plainly marked that they are not to be opened before the date and hour set out herein, and should show the number of the parcel and the name of the field. No bids received after the hour fixed herein for receiving bids will be considered. The remainder of the bonus and the annual rental must be paid and an acceptable surety bond in the sum of at least double the amount of rental, but in no case less than $1,000 nor more than $5,000, must be furnished by a successful bidder prior to the issuance of a lease. An acceptable $5,000 surety bond will be required prior to commencing drilling operations on the land. The deposits of the other bidders will be returned upon acceptance of the successful bids. Bidders are warned against violation of section 1860, Title 18, U. S. Code, prohibiting unlawful combination or intimidation of bidders. The right is reserved to reject any and all bids. Royalties payable to the United States will be at the rate of 12½ per cent to 25 per cent for oil, and 12½ per cent to 16 2/3 per cent for gas, in accordance with Schedule B in the lease form. Annual rental will be at the rate of $1.00 per acre. The lands are in the known geologic structure of the Bolton Creek field and are offered in the following parcels, all in T. 29 N., R. 81 W., 6th P. M., Wyoming: Parcel No. 1, Sec. 4, S½NE¼, SE¼NW¼, NE¼SW¼, 160 acres. Parcel No. 2, Sec. 10, N½SW¼, 80 acres. Total 240 acres. Bids must be submitted on or before 1 p.m., January 18, 1950, and must be submitted on each parcel separately, but no objection will be made to the award of both parcels to the same successful bidder. Marion Clawson, Director.

LEGAL

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SW SE SW 4-9n-8e, dry, TD 3,582 ft., lower Wewoka 1,520 ft., Calvin 1,870 ft., Senora sand 2,160 ft., lime 3,180 ft., Booch 3,330 ft., Gilcrease 3,410 ft., Gilcrease sand 3,490 ft.

Stephens County: Jackson 1 Kincannon, SW NW SE 14-1n-6w, dry, TD 2,510 ft., base Duncan-top Clearfork 190 ft., Pontotoc 1,897 ft., sand 2,492 ft.

SOUTHWEST TEXAS

Jim Hogg County Test To Be Completed as Oiler

CORPUS CHRISTI.—Gorman & DeLange et al are preparing to complete the 3 Mary M. Lasater Estate for an oil discovery well in Jim Hogg County. After running several drill-stem tests and getting good oil recoveries, operators set 5^1_2-in. casing and perforated from 2,096-98 ft. The well flowed an estimated 32 bbl. of oil daily through a 7 64-in. choke, with tubing pressure at 300 psi. and casing pressure at 600 psi. Operators are waiting on final gage. The new discovery is located in the Sam Honey Survey 270.

Three miles southeast of Sejits, in Brooks County, I. K. Howeth et al of San Antonio recovered 330 ft. of oil on a drill-stem test run at 4,805-16 ft. and developed 19 psi. working pressure in the 2 Kathleen Hocker Alexander. The prospective discovery is located in the Los Megueyes de Palo Blanco Grant.

In the area of the old Zobrowski field, Guadalupe County, Felix D. Glass 1 Frank Zobrowski reportedly flowed approximately 1,000 bbl. of oil in 3 days. The wildcat is said to have come in through uncased hole and to have flowed for several days before operators could kill it and run casing. Early attempts to cement the casing failed. Test is in James D. Clements Survey 14, at total depth of 2,415 ft. and is said to be flowing from the Edwards lime. The old Zobrowski field was discovered in 1931, and is now producing only 21 bbl. of oil a day.

One mile southeast of Alfred, The Texas Co. has completed the 1 E. M. Brownlee, Block 33, Davis Gardens Subdivision, for a new discovery in Jim Wells County. The well flowed 68 bbl. of oil and a small amount of water in 24 hours from perforations at 3,353-58 ft. It has 5^1_2-in. casing set at 3,615 ft. and total depth is 5,700 ft.

SOUTHWEST TEXAS (DISTRICTS 1 AND 4) WILDCAT FAILURES

Brooks County: H. L. Hunt 1 Charles Hornsby, La Alameda Pilar Zarate Bayarena Gr., A-52, 2^1_2 mi. NE of Rachal, dry, TD 7,016 ft.

Sun Oil Co. 5 Mary M. Lasater, AB&M Sur. 289, 6 mi. SE of Falfurrias and 1^3_4 mi. W of Gyp Hill, dry, TD 7,827 ft.

LaSalle County: Rock Hill Oil Co. 1 La Salle Co., Bland & Nelson Subd. 2 of O'Connor Ranch, J. P. Mills Sur. 1,001, 10 mi. SW of Hindes, dry, TD 6,321 ft.

Milam County: Buda Oil Co. 1 A. E. Baggett-Ola Sims, Juan J. Acosta Gr., 17 mi. NW of Rockdale, dry, TD 2,140 ft.

M. L. Richards 1 A. W. Esslinger, Charles Small Sur., 2^1_2 mi. S of Ben Arnold, 7 mi. N of Cameron, dry, TD 2,316 ft.

Hewitt & Dougherty 4 K. D. Roche, D. J. Mitchell Sur., 5 mi. SW of Woodsboro, dry, TD 6,500 ft.

San Patricio County: Luling Oil & Gas Co. 1 W. F. Scull, Lot 122, Welder and Odem Subd., $^1_2$ mi. W of Odem, dry, TD 5,529 ft.

Skelly Oil Co. 1 L. H. Harwood, Sec. 14, Geo. H. Paul Subd., Coleman-Fulton Pasture lands, dry, TD 7,362 ft.

Webb County: Calhoun & Campbell 2 Yeager Armstrong et al, Las Animas Gr., 15 mi. SE of Mirando City, dry, TD 2,368 ft.

Williamson County: D. B. Scully 2 Otto Bachmeyer, Peter Cartwright Sur., 6^1_2 mi. SE of Taylor, dry, TD 1,252 ft.

Zapata County: Don H. Marsh et al 1 E. A. McCampbell Heirs, M. C. Kesterson Sur. 274, A-181, 35 mi. SW of Hebbronville, dry, TD 2,585 ft.

KANSAS

Two More Wildcats Open Pools in Stafford County

PETROLEUM, INC., is opening two new pools in Stafford County. Its 1 Kooperman, NE NW NE 20-21-13, 1 mile west of the Grow pool, swabbed at the rate of 3 bbl. of oil per hour while testing Arbuckle lime at a total depth of 3,679 ft. Its 1 Brown, SW SE SW 18-21-13, only 1^1_2 miles to the west and a mile north of the Pundsack pool, swabbed 2 bbl. per hour from the same pay with bottom at 3,678 ft.

The same company has another prospective new pool in Ellis County where its 1 Froelich, SE SE SW 22-12-16, a mile northwest of the Northeast Emmeram pool and about 2 miles southwest of the Blue Hill pool, has run casing to test showings encountered in the Arbuckle, topped at 3,467 ft. (—1,479 ft.). Rotary hole was drilled to 3,470 ft. Showings also were encountered in the Lansing-Kansas City lime, where a drill-stem test at 3,600-85 ft. resulted in a recovery of 150 ft. of oil-cut mud.

Aladdin Petroleum Corp. and associates 1 Henderson, CWL SW NW 25-24-13, $^3_4$ mile southeast of production in the St. John pool, Stafford County, recovered 30 ft. of oil and gas-cut mud in a drill-stem test at 3,623-34 ft. in Lansing-Kansas City lime, topped at 3,594 ft. (—1,682 ft.), but is drilling ahead for a look at lower potentially productive zones.

Crown Drilling Co. 1 Foster, SE SE NE 29-12-14, new pool opener in Russell County, pumped 12 bbl. per day on potential tests after swabbing at the rate of 350 bbl. per day. Production is from Lansing lime, topped at 2,804 ft. (—1,180 ft.), with open hole at 2,841-54 ft. It is 2 miles west of the Claussen pool, nearest production.

In Barton County, R. L. Williams 1 Buckbee, SW NE NE 14-20-12, $^3_4$ mile west of Silica field production and about the same distance north of the West Marchand pool, swabbed 2 bbl. per hour for 4 hours while testing Arbuckle lime, topped at 3,352 ft. (—1,550 ft.). Total depth is 3,360 ft. with casing at 3,354 ft.

In the same county, Franco Central Oil Co. and associates 1 Klug, NE NE SW 8-17-12, 3^1_2 miles south of Beaver, and about 2^1_2 miles from other production, swabbed 3 bbl. per hour for 7 hours while testing Arbuckle lime at 3,377-79 ft. (—1,472-14 ft.).

KANSAS WILDCAT FAILURES

Barton County: Transit Corp. 1 Birzer, NE NE NW 22-17s-12w, dry, TD 3,392 ft., Arbuckle 3,362 ft.

Butler County: Weidemann 1 Brennan, NW NW NW 8-26s-3e, dry, TD 2,864 ft., Mississippi lime 2,799 ft.

Cowley County: Wakefield 1 Evans, SE NE NE 24-31s-4e, dry, TD 2,915 ft., Mississippi lime 2,905 ft.

Ellis County: Aylward 1 Bittle, SW SW SE 2-13s-19w, dry, TD 3,793 ft., Arbuckle 3,758 ft.

Jones-Shelburne & Farmer 1 Gobel, SW SW SW 10-15s-19w, dry, TD 3,713 ft., Heebner 3,280 ft., Arbuckle 3,655 ft.

Ellsworth County: Derby Oil Co. 2 Christianson, SW SW SE 28-17s-10w, dry, TD 3,350 ft., Heebner 2,832 ft., Arbuckle 3,306 ft.

Geary County: Payrock 1 Johnston, NE NE 9-12s-6e, dry, TD 2,660 ft., Lansing 1,460 ft., Kansas City 1,560 ft., Marmaton 1,740 ft., Mississippi lime 1,943 ft., Kinderhook 2,019 ft., Hunton 2,182 ft., Maquoketa 2,529 ft., Viola 2,636 ft.

Russell County: Nadel & Gussman 1 Foster, NE NE NW 11-12s-15w, dry, TD 3,229 ft., Topeka 2,629 ft., Heebner 2,834 ft., Arbuckle 3,204 ft.

Sedgwick County: Dunne & Strait 6 Semisch, NW NE NE 4-29s-2w, dry, TD 2,835 ft., Bartlesville 2,777 ft., Mississippi lime 2,821 ft.

Stafford County: Lewis et al 1 Hall, SE SE SW 23-21s-13w, dry, TD 3,687 ft., Viola 3,591 ft., Simpson 3,638 ft., Arbuckle 3,682 ft.

Harms-Knight 1 Stroble, NW NW NW 8-22s-14w, dry, TD 3,940 ft., Viola 3,796 ft., Simpson 3,851 ft., Arbuckle 3,910 ft.

Sumner County: Colpitt 1 Fisher, NE NW NW 6-31s-1e, dry, TD 4,069 ft., Simpson 3,917 ft., Arbuckle 4,030 ft.

Mizel Bros. 1 May, SW SW NE 12-33s-1e, dry, TD 3,796 ft., Kinderhook 3,679 ft., Simpson 3,730 ft., Arbuckle 3,780 ft.

Legal Battle Ends

LOS ANGELES.—The NLRB has agreed to hold a bargaining election for the employes of Lloyd Corp., operators of the Lloyd lease in Ventura Avenue field and the Lloyd-Houchin lease in Paloma field.

The agreement ends a long legal battle that began shortly after the 1948 strike. At that time the board was petitioned to hold an election to determine a bargaining agent. The move was begun by a group claiming to represent 80 per cent of the employes in an effort to decertify the CIO Oil Workers Union. The CIO union represented the employes during the strike.

Refinery Reopening

A 11,500-ton tanker load of Persian Gulf crude oil has arrived in Dunkirk, France, for the opening of the reconstructed refinery of Soc. Generale des Huiles de Petrole in Dunkirk.

The Dunkirk plant was destroyed by bombing and fire in 1940. The operating company is an affiliate of Anglo-Iranian Oil Co., Ltd., and the new refinery is expected to process 300,000 tons (about 6,000 bbl. daily) in 1950. At full capacity it will handle 1,400,000 tons a year.

Repressuring Hazard

WASHINGTON.—Repressuring of oil sands with natural gas in secondary-recovery operations entails serious explosion hazards, the Bureau of Mines warned last week, particularly where gas-air mixtures are used.

Undiluted natural gas may be compressed for injection into underground reservoirs with little added danger, the bureau said, but the hazards increase sharply when natural gas-air mixtures are used. Investigations have demonstrated, however, that control of the oxygen content by the introduction of inert gases, particularly nitrogen, provides an effective method for minimizing explosion dangers with gas-air mixtures at atmospheric or lower pressures.

November Completions and Footage Up Slightly Over 1948

by Polly DeArmond

TOTAL wells and footage reported for November edged slightly ahead of those drilled during the corresponding month last year. Tabulations show an increase of 78 wells, or 2.3 per cent, in completions, with an 8.6 per cent gain in oil and gas producers, over November 1948. There were 3,507 wells finished, made up of 1,994 oil wells, 267 gas wells, and 1,246 dry holes. Depth classifications of these completions showed no great variance from the same month of the previous year, and total footage of 11,905,030 ft. represented a gain of about 1 per cent.

Comparisons by Areas

The central U. S. reflected the increases in the summary of operations, while the eastern and western parts of the country noted declines. The greatest gains were recorded in the Texas-New Mexico section, which had 1,259 completions with total footage of 5,054,768 ft. for the month as compared with 1,068 wells and 4,593,666 ft. in November last year; increases of 17.9 per cent in completions and 10 per cent in footage drilled.

Completions in the southern states (Arkansas, Louisiana, and Mississippi) were up 41 wells, a 17.8 per cent increase, with a 4.2 per cent increase in footage. The Mid-Continent area, including Oklahoma, Kansas, Nebraska, and Missouri, rose 12.9 per cent in wells to total 745, and 3.5 per cent in footage over the same month of 1948. The North Central group, comprised of Indiana, Kentucky, Ohio, Illinois, and Michigan, reported shallower wells with an increase of 2.9 per cent in completions and a decrease of 6.9 per cent in footage.

Three areas declined in both completions and footage compared with November 1948. The Eastern district (New York, Pennsylvania, and West Virginia) fell off 41 per cent in wells and 37.4 per cent in footage. Deeper drilling was indicated in the Rocky Mountain region by the fact that while completions dropped 17.7 per cent, footage declined only 3.2 per cent. The Pacific Coast was down 15.6 per cent in wells and 7.7 per cent in footage.

Rotary Rigs Record

While the 4,505 reported active wells was by no means a record for this year, and although the number of rotary units in operation was below that of last year, rotary activity set a new high for the year. This 1949 record of 2,154 rotary rigs was established during the same period that 1948's peak of 2,381 was reached.

SUMMARY OF COMPLETIONS, NOVEMBER 1949

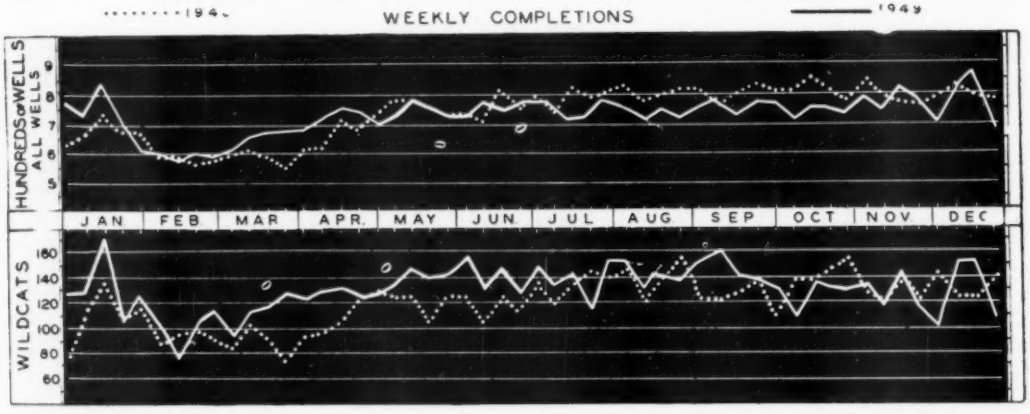
	Total comp.	Oil	Gas	Dry	Under 2,500 ft.	2,500-5,000 ft.	5,000-7,500 ft.	7,500-10,000 ft.	10,000-12,500 ft.	Over 12,500 ft.	Total footage	Rigs and drilling
New York	§83	42	§1	40	82	§1	0	0	0	0	120,910	63
Pennsylvania	137	68	14	55	124	13	0	0	0	0	229,843	230
West Virginia	64	11	35	18	36	26	2	0	0	0	171,986	149
Ohio	101	38	26	37	58	43	0	0	0	0	222,009	141
Indiana	104	40	5	59	82	22	0	0	0	0	205,062	139
Kentucky	119	58	3	58	108	11	0	0	0	0	180,819	89
Illinois	249	125	1	123	154	95	0	0	0	0	512,828	305
Michigan	67	31	2	34	40	27	0	0	0	0	160,642	146
Kansas	341	148	63	130	53	284	4	0	0	0	1,068,207	437
Neb., Mo., Iowa	11	6	0	5	3	7	1	0	0	0	38,552	11
Oklahoma	393	232	19	142	124	188	60	15	5	1	1,321,684	690
Texas	1,214	778	68	368	359	509	252	70	21	3	4,831,806	1,334
North	268	168	1	99	142	96	29	1	0	0	752,434	172
West Central	183	91	3	89	80	100	3	0	0	0	523,829	164
West	319	269	2	48	69	94	111	30	12	3	1,592,385	435
Panhandle	97	62	30	5	3	94	0	0	0	0	295,226	121
East	75	44	3	28	9	46	14	6	0	0	328,100	79
Gulf Coast	145	85	16	44	20	42	49	26	8	0	807,721	201
Southwest	127	59	13	55	36	37	46	7	1	0	552,201	162
Louisiana	213	136	16	61	88	34	31	37	20	3	1,052,865	215
Northern	145	90	16	39	86	24	26	8	1	0	468,136	63
Southern	68	46	0	22	2	10	5	29	19	3	584,729	152
Arkansas	33	20	0	13	12	16	4	1	0	0	111,680	14
Mississippi	25	12	0	13	1	1	13	6	4	0	176,434	30
Ala., Ga., Fla.	0	0	0	0	0	0	0	0	0	0	0	7
Montana	24	13	2	9	19	3	2	0	0	0	62,031	74
Wyoming	67	39	1	27	8	19	38	1	0	1	322,224	129
Colorado	4	1	0	3	0	1	3	0	0	0	20,542	20
Utah	4	1	0	3	0	0	3	0	0	1	30,100	17
New Mexico	45	34	5	6	7	25	7	4	1	1	202,872	146
California	206	161	6	39	86	62	31	20	7	0	827,061	115
Dakotas	3	0	0	3	0	2	0	1	0	0	14,783	4
Total November 1949	3,507	†1,994	267	*1,246	1,444	1,389	451	155	58	10	11,905,030	14,505
Total October 1949	3,278	1,822	259	1,197	1,397	1,283	385	134	62	17	10,752,845	4,614
Total November 1948	3,429	1,964	226	1,239	1,414	1,369	376	191	79		11,799,171	5,144
Cumulative 1949	35,289	19,819	2,620	12,850	13,657	14,330	4,531	1,813	831	127	124,776,071	
Cumulative 1948	36,142	20,549	2,628	12,965	14,384	14,782	4,159	1,964	853		124,300,055	
Canada	65	50	1	14	3	33	25	3	0	1	261,885	94

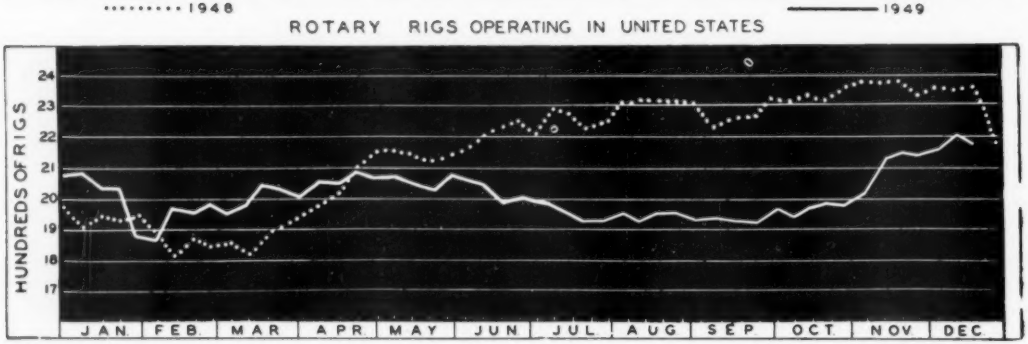
*Incl. 104 service wells: N. Y. 40, Pa. 45, Ohio 5, Ill. 1, Kans. 5, Okla. 2, No. Tex. 3, W. Cent. Tex. 1, W. Tex. 2. †Incl. 28 distillate wells: Okla. 3, W. Tex. 2, E. Tex. 5, Tex. Gulf 3, No. La. 8, So. La. 4, Miss. 3. ‡Incl. all well rigged up and/or drilling at end of month. §Incl. 1 Md. at 4,910 ft.

WEEKLY WELL COMPLETIONS . . WEEK ENDED DECEMBER 24, 1949

	Total of all wells							Wildcat completions and discoveries										
						Dec. 24							Cumulative total, 1949					
	Comp.	Oil	Gas	Dry	Footage	1949	1948	Oil	Dist.	Gas	Dry	Total	Oil	Dist.	Gas	Dry	Total
New York	19	10	0	*9	29,641	742	1,451	0	0	0	0	0	0	0	1	0	1
Pennsylvania	25	11	1	†13	42,138	1,806	2,486	0	0	0	0	0	0	0	4	2	6
West Virginia	9	3	2	4	17,630	507	811	0	0	0	0	0	1	0	12	11	24
Ohio	16	5	4	‡7	33,801	1,060	1,389	1	0	0	0	1	3	0	2	30	35
Indiana	10	3	0	7	19,204	1,269	1,111	1	0	0	2	3	37	0	4	220	261
Kentucky	21	15	2	4	37,186	1,021	792	1	0	0	1	2	29	0	0	77	106
Illinois	47	25	0	22	100,435	2,718	2,485	0	0	0	1	1	63	0	4	487	554
Michigan	19	9	0	10	48,577	976	876	0	0	0	6	6	29	0	3	303	335
Kansas	76	32	10	§34	253,049	3,273	3,137	0	0	0	13	13	75	0	9	421	505
Neb., Mo., Iowa	1	0	0	1	5,047	32	9	0	0	0	1	1	2	0	0	18	20
Oklahoma	93	49	8	36	303,843	4,280	4,166	3	0	1	19	23	141	15	17	607	780
Texas	211	135	6	70	906,267	12,936	11,958	2	0	1	34	37	387	43	114	2,182	2,726
North Central (Dist. 7-B & 9)	51	27	1	23	163,348	4,311	3,752	0	0	1	8	9	172	0	20	855	1,047
West (Dist. 7-C & 8)	46	41	0	5	238,138	3,167	3,181	2	0	0	3	5	62	1	6	267	336
Panhandle (Dist. 10)	12	12	0	0	37,275	932	653	0	0	0	0	0	1	0	1	9	11
Eastern (Dist. 5, 6, & 6-P)	19	13	0	6	100,857	778	607	0	0	0	4	4	12	4	4	153	173
Gulf Coast (Dist. 2 & 3)	37	20	2	15	191,202	1,915	1,857	0	0	0	8	8	78	29	48	366	521
Southwest (Dist. 1 & 4)	46	22	3	21	175,447	1,833	1,908	0	0	0	11	11	62	9	35	532	638
Louisiana	60	33	3	24	292,091	2,286	2,282	0	0	0	5	5	53	21	4	202	280
Northern	39	20	3	16	119,203	1,390	1,518	0	0	0	2	2	6	3	0	97	106
Southern	21	13	0	8	172,888	896	764	0	0	0	3	3	47	18	4	105	174
Arkansas	8	4	0	4	26,007	317	308	0	1	0	4	5	3	1	1	71	76
Mississippi	7	3	0	4	47,784	326	414	0	0	0	3	3	6	2	1	104	113
Southeastern States	2	1	0	1	9,945	47	53	0	0	0	1	1	1	0	0	37	38
Montana	1	0	1	0	2,309	278	304	0	0	0	0	0	5	0	2	33	40
Wyoming	9	5	0	4	56,269	587	583	1	0	0	3	4	24	0	1	116	141
Colorado-Utah	1	0	0	1	4,297	134	224	0	0	0	1	1	3	0	0	67	70
New Mexico	7	4	1	2	27,656	486	593	0	0	0	0	0	13	1	2	51	67
California	35	29	1	5	130,940	2,531	2,813	0	0	0	2	2	36	0	7	433	476
Dakotas	0	0	0	0	0	18	2	0	0	0	0	0	0	0	0	15	15
Total United States	677	376	39	262	2,394,116	37,630	38,282	9	1	2	96	108	911	83	188	5,487	6,669
Total previous week	871	479	76	316	2,979,692			22	2	4	125	153	902	82	186	5,391	6,561
Total December 25, 1948	776	437	56	283	2,862,599			17	3	5	118	143	858	80	239	5,045	6,222

Service wells included: *9, †11, ‡1, §2.





DAILY AVERAGE PRODUCTION FOR WEEK

	Dec. 24 crude oil	B. of M. demand	Dec. 17 crude oil
Alabama	1,450		1,550
Arkansas	74,500		74,150
California	868,000		868,000
Colorado	60,500		62,400
Eastern	56,200		55,800
Florida	935		1,000
Illinois	176,400		175,600
Indiana	28,400		28,000
Kansas	286,450		291,250
Kentucky	25,100		25,000
Louisiana	536,500		536,300
North Louisiana	120,900		120,700
South Louisiana	415,600		415,600
Michigan	45,750		44,100
Mississippi	92,550		102,100
Montana	24,900		25,700
Nebraska	1,450		1,450
New Mexico	131,800		131,800
Oklahoma	410,600		408,150
Texas	1,976,700		1,976,700
Dist. 1 (Southwest)	26,000		26,000
Dist. 2 (Southwest)	116,625		116,625
Dist. 4 (Southwest)	185,825		185,825
Dist. 3 (Gulf Coast)	366,775		366,775
Dist. 5 (Eastern)	33,800		33,800
Dist. 6 (Eastern)	83,900		83,900
East Texas field	236,000		236,000
Dist. 7-C (West)	51,075		51,075
Dist. 8 (West)	582,400		582,400
Dist. 7-B (W. Central)	61,375		61,375
Dist. 9 (Central)	140,525		140,525
Dist. 10 (Panhandle)	92,400		92,400
Utah	2,900		3,000
Wyoming	138,700		139,700
Total United States	*4,941,785		4,951,750
Change from previous week, down 9,965			
Canada	58,490		58,450

Total U. S. production January 1-December 24 †1,816,926,360 bbl.
Same period last year (crude plus cond.) 1,984,308,805 bbl.

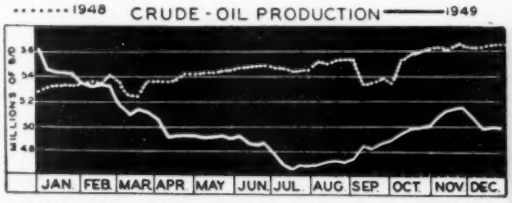
*Not incl. 82,345 bbl. condensate. †Incl. 29,435,480 bbl. condensate. ‡December demand not announced.

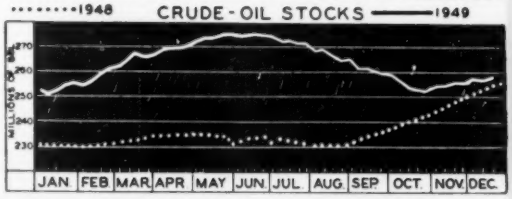
CRUDE-OIL STOCKS BY STATES OF ORIGIN*

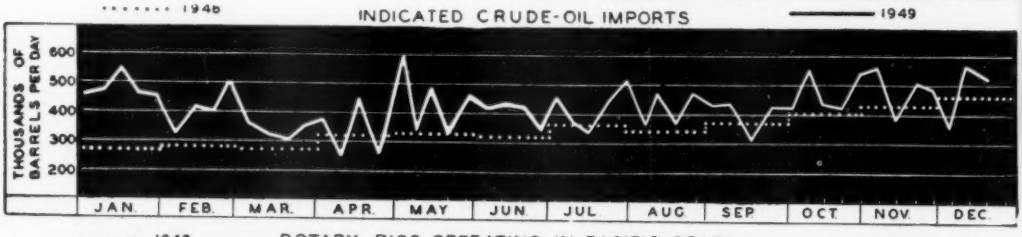
(Thousands of barrels)

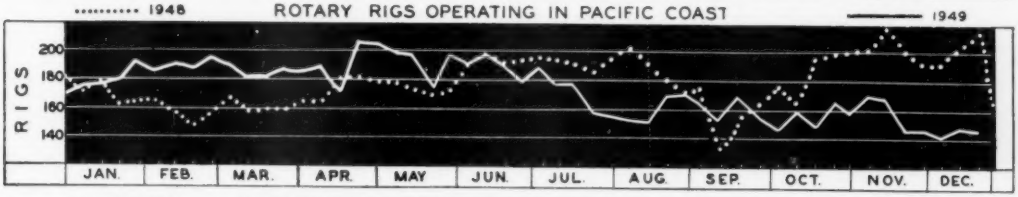
	Dec. 17, 1949	Dec. 10, 1949	Dec. 11, 1948
Pennsylvania Grade	2,857	2,932	2,903
Other Appalachian	1,916	1,778	1,464
Illinois, Indiana, Michigan	11,964	11,644	12,510
Arkansas	2,913	2,685	3,454
Louisiana	13,480	14,037	12,396
North	3,300	3,433	3,240
Gulf	10,180	10,604	9,156
Mississippi	2,404	2,475	2,784
New Mexico	7,529	7,414	6,340
Oklahoma and Kansas	37,611	37,613	36,292
Texas	117,369	116,295	117,840
East Texas	16,363	16,160	15,948
West Texas	43,619	43,783	45,465
Texas Gulf	29,931	29,621	28,733
Other Texas	27,456	26,731	27,694
Rocky Mountain	13,978	13,715	12,232
California	37,924	37,763	34,320
Foreign	8,031	8,194	6,829
Total United States	257,976	256,545	249,364

†Bureau of Mines.







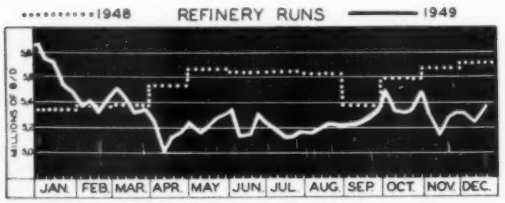


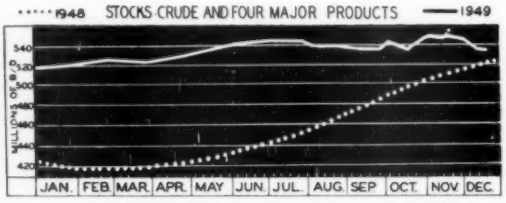
A.P.I. REFINERY REPORT, DECEMBER 17

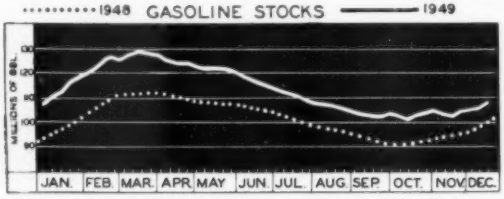
(Thousands of barrels)

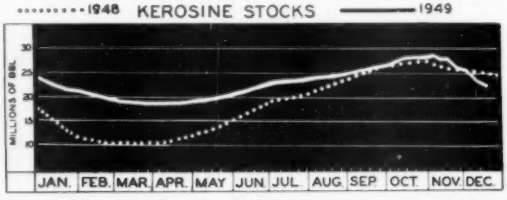
District	Daily avg. crude runs	Daily average production				Stocks at refineries, bulk terminals, in transit and in pipe lines				Bureau of Mines, December 1948				
		Gasoline*	Kerosine	Distillate	Residual	Gasoline†	Kerosine	Distillate	Residual	Daily avg. crude runs	Daily average production: Gasoline*	Kerosine	Distillate	Residual
East Coast	848	337.0	48.4	213.7	208.0	22,805	9,424	24,922	9,512	856	322.9	39.8	211.4	241.5
Appalachian:														
District 1	87	41.4	5.9	19.4	9.0	2,625	333	892	350	101	45.4	7.7	15.0	14.7
District 2	64	29.8	5.4	5.3	14.0	1,262	121	211	136	72	36.4	4.9	7.9	14.5
Ind., Ill., Ky.	944	305.7	74.9	169.1	179.0	21,862	4,494	12,091	3,863	939	483.1	62.5	152.7	158.7
Okla., Kans., Mo.	429	235.6	21.1	80.9	56.7	10,143	1,200	5,868	1,594	437	240.6	22.5	75.1	80.6
Inland Texas	187	133.0	13.3	16.4	34.6	3,937	580	1,007	1,154	250	162.0	14.8	22.3	59.3
Texas Gulf Coast	1,312	610.6	101.3	298.2	211.3	16,429	3,177	15,691	6,489	1,468	645.3	112.2	334.1	259.2
La. Gulf Coast	471	238.0	65.7	86.3	68.4	5,869	1,293	4,888	2,417	452	200.1	58.2	100.4	74.6
N. La. and Ark.	67	30.6	6.7	8.9	14.7	2,631	386	619	308	85	33.2	8.8	11.3	20.1
Rocky Mountain:														
New Mexico	11	6.0		1.7	2.7	87	35	88	30	14	7.5	0.5	2.1	3.7
Other Rocky Mtn.	175	77.7	4.6	31.6	38.0	3,067	330	1,893	643	152	71.6	4.3	26.4	34.9
California	794	373.0	17.7	106.1	314.4	17,773	894	14,280	36,290	965	378.1	13.8	151.7	399.9
December 17, 1949	5,389	2,618.4	363.0	1,037.6	1,150.8	108,490	22,267	82,450	62,786	5,791	2,626.2	350.0	1,110.4	1,361.7
December 10, 1949	5,234	2,602.7	295.4	1,005.3	1,121.9	106,146	23,397	85,926	64,476					
December 18, 1948	5,766	2,557.4	362.4	1,081.6	1,356.3	98,225	25,227	76,344	64,445					

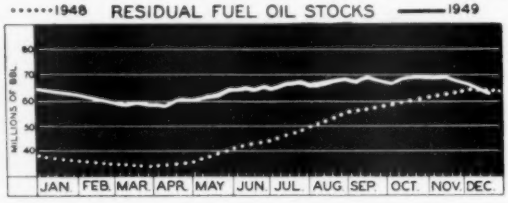
*At refineries including natural blended. †Finished and unfinished.

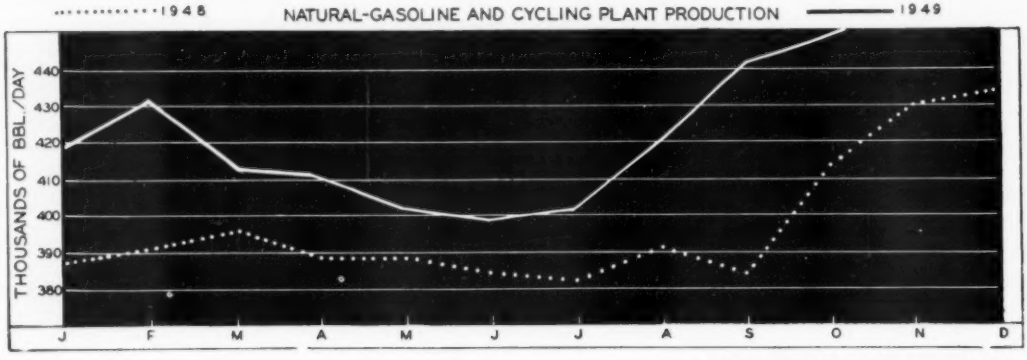












CRUDE PRICES GRAVITY SCHEDULE

Gravity—	Calif. Hill, Signal	Kansas homa, Okla-	Tex.* Coast Gulf	Tex.† West
18-18.9	$1.53			
19-19.9	1.63			
20-20.9	1.73	$2.25		$2.12
21-21.9	1.82	2.27		2.14
22-22.9	1.92	2.29		2.16
23-23.9	2.02	2.31		2.18
24-24.9	2.12	2.33	$2.56	2.20
25-25.9	2.22	2.35	2.58	2.22
26-26.9	2.31	2.37	2.60	2.24
27-27.9	2.37	2.39	2.62	2.26
28-28.9	2.42	2.41	2.64	2.28
29-29.9	2.48	2.43	2.66	2.30
30-30.9	2.54	2.45	2.68	2.32
31-31.9	2.59	2.47	2.70	2.34
32-32.9	2.64	2.49	2.72	2.36
33-33.9		2.51	2.74	2.38
34-34.9		2.53	2.76	2.40
35-35.9		2.55	2.78	2.42
36-36.9		2.57	2.80	2.44
37-37.9		2.59	2.82	2.46
38-38.9		2.61	2.84	2.48
39-39.9		2.63	2.86	2.50
40 and above		2.65	2.88	2.52

*For crude from Daboval, El Campo and Sand Point.

†Includes Lea County, New Mexico. Last general price change represented a 50-cent increase becoming effective December 6, 1947. Above changes do not include recent reductions of a few buyers applying principally to low-gravity grades.

FLAT CRUDE PRICES

Representative posted schedules per barrel	
East Texas†	$2.65
Kettleman Hills, California*	2.77
Beauregard Parish	2.60
Illinois Basin	2.77
Pecos County, Texas (Yates)	2.35
Bradford, Pennsylvania	3.54
Eastern Ill. and Western Ind.†	2.77
Tomball, Texas Gulf Coast	2.83

*37°-37.9°; †35° and above.

FUEL markets in the past week reflected weather conditions in the major consuming areas. The promise of lower temperatures in the Midwest held the number of shipping instructions for the Group 3 area at a high level while warm weather on the East Coast brought a temporary softening in the No. 2 markets in New York Harbor and to a lesser extent on the Gulf Coast.

New York City temperatures were well above normal. Maximum for December 22 was 62.2°, a record for that date. The 4-day average for the upper part of the state was running about 20° above normal. The season's average for all of the northeastern states is colder than last year but warmer than normal. The result was a slowing down of consumer purchases in the week before Christmas. Some distress No. 2 fuel was reported offered at 8 cents a gallon. This tended to delay the expected firming of the No. 2 market on the Gulf Coast where material is still available at 7 cents.

Total kerosine stocks dropped 5,259,000 bbl. in the 4-week period ended December 17 compared with a decrease of 1,566,000 bbl. in the same weeks last year. Stocks are now about 3,000,000 bbl. less than a year ago. This draft on kerosine inventories has resulted in a strong market. The recent increase to 7.75 cents a gallon on the Gulf Coast by Esso Standard Oil Co. still leaves this price at about the "low" for the area. Smaller lots are reported to be moving at 8.25 cents.

Increased demand for residual fuels in the industrial areas of the north central states has held the No. 6 market very firm. Group 3 residual prices are up about 10 cents a barrel with suppliers forecasting still higher prices.

REPRESENTATIVE QUOTATIONS

Representative spot-market quotations of leading suppliers as of December 27, 1949. Figures are f.o.b plant for tank-car shipments in cents per gallon, except for residual fuel oil which shows the price per barrel and wax, in cents per pound.

GASOLINE, KEROSINE, AND FUEL OILS

	Mid-Continent Group 3	New York Harbor (barge)	Tex. Gulf Coast
Regular gasoline, 74-76 octane	9½-10	10.5-11.1	9-9¾
Premium gasoline, 78-80 octane	10⅜-11	11.5-12.1	9¾-10¾
42-44 w.w. kerosine	8-9¼	8.9-9	7¾-8.25
No. 2 straw fuel oil	7-7⅜	8.2-8.5	7-7¼
No. 6 residual	$1.20-1.25	$2.05	$1.65-1.75

NATURAL GASOLINE

	Group 3	North Texas	N. La.
Grade 26-70	5.7⅛	5⅜	5⅝
Grade 18-55	7.1	6.5	6.8

LUBRICATING OILS SOUTH TEXAS

200 vis., No. 2-3 neutral	10.5
750 vis., No. 3-4 neutral	12.75
2,000 No. 5-6 neutral	14-14.5

LUBRICATING OILS

Mid-Continent

150-160 vis., D bright stock, 0-10 pp.	17-19
200 vis., No. 3 neutral, 0-10 pp.	11.5-14

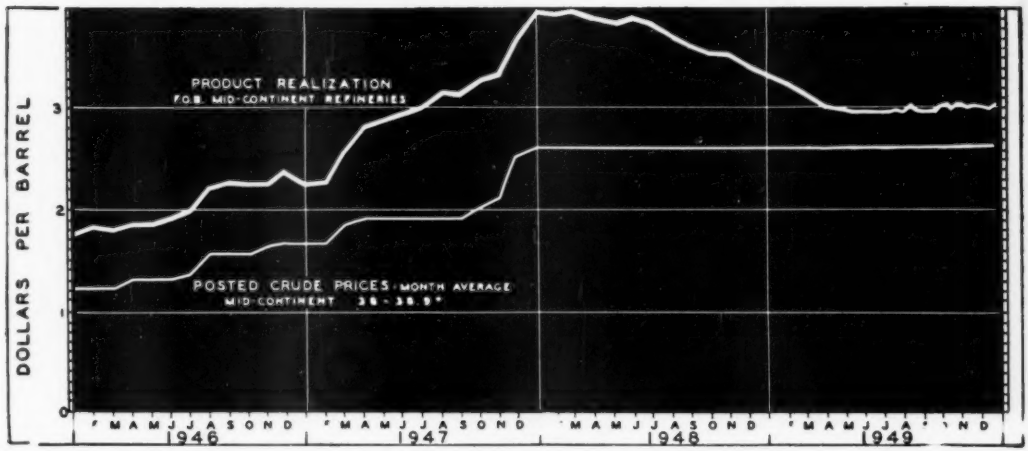
Western Pennsylvania

145-155 vis., 10 p.t. bright stock	19.5-20.5
180 vis., 0 p.t. neutral	20.5-21.5

WAX

Mid-Continent

132-134 A.M.P.	4.25



In this trend chart refinery realization is based on average Mid-Continent grade crude oil (not 38° gravity only) and average prices for refinery products as published in The Oil and Gas Journal basis Oklahoma (Group 3). Refinery yields confined to gasoline, kerosine, distillate, and fuel oil.

It takes 52 tests to earn this!

When you order Kaiser Steel pipe, *you can be sure of highest quality.* Here's why:

A total of 52 different analyses, tests and inspections are made of Kaiser Steel pipe, and the materials that go into it.

Every steel plate, every coil of skelp, every length of pipe, is checked and rechecked.

That's why experienced linemen have found that Kaiser Steel pipe measures up to precise specifications on every count.

Kaiser Steel line pipe to latest API specifications—in diameters up to 30 inches, and in lengths up to 40 feet—is now available. Shipping points are Fontana and Napa, California.

It's good business to do business with

Kaiser Steel

KAISER STEEL PIPE SPECIFICATIONS • All pipe manufactured to latest A.S.T.M. and A.P.I. specifications

Type	Diameter	Length	Wall Thickness	Shipping Point
Continuous Weld—Threaded and Coupled—(Galvanized or Black)	½" to 4" nominal I.D.	Uniform 21'	Standard	Fontana, Calif.
Continuous Weld—Plain End—(Galvanized or Black)	2⅜" to 4½" O.D.	Up to 40'	Standard	Fontana, Calif.
Electric Resistance Weld—Plain End	8⅝" to 20" O.D.	Up to 40'	.188" to .500"	Napa, Calif.—Basalt-Kaiser
Electric Resistance Weld—Plain End	5⅝" to 12¾" O.D.	Up to 55'	.188" to .400"	Fontana, Calif.
Electric Fusion Weld—Expanded—Plain End	22" to 30" O.D.	Up to 40'	.188" to .500"	Napa, Calif.—Basalt-Kaiser

Prompt, dependable delivery at competitive prices • KAISER STEEL CORPORATION, Los Angeles, Oakland, Seattle, New York

EQUIPMENT MEN ... in the News

Ode is Manager, Findlay Division of Gar Wood

K. F. ODE

Edward F. Fisher, president of Gar Wood Industries, Inc., has announced the appointment of Kenneth F. Ode as division manager of the Findlay division, which manufactures the Buckeye line of ditchers. As new division manager, Ode will be in charge of the Findlay Ohio, plant, which was formerly Buckeye Traction Ditcher Co.

Ode was formerly associated with Falk Corp., and came to Buckeye from Trackson Co., of Milwaukee, manufacturers of side-boom rigs for pipe-laying tractors.

Carter Appoints Wheatley For Oklahoma and Kansas

Fred Lewin, vice president of Ralph B. Carter Co., of Hackensack, N. J., has announced the appointment of the Charles Wheatley Co., Tulsa, as Carter representatives for the states of Oklahoma and Kansas.

Wheatley Co. will handle the entire Carter "Humdinger" line of self-priming centrifugal and diaphragm pumping units, to pipe-line companies, pipe-line contractors, and pipeline supply houses, as well as to the production, refining and marketing divisions of the oil and gas industry.

Lukens Is Hollingshead General Sales Manager

W. H. LUKENS

William H. Lukens has been appointed to the newly created post of general sales manager of R. M. Hollingshead Corp., according to an announcement by R. M. Hollingshead, Jr., chairman of the board. Lukens was formerly vice president in charge of export sales for the New Jersey chemical firm.

The creation of this new position by the corporation's board of directors was made necessary by the increasing complexity of the company's selling operations and its constant expansion into new fields. As vice president and general sales manager, Lukens assumes complete responsibility for the corporation's sales activities through its various divisions.

R. C. Hood Elected Ansul Chemical Co. President

Robert C. Hood has been elected president of Ansul Chemical Co., Marinette, Wis., succeeding his brother, F. James Hood, who died in New York November 10. The 32-year-old new president had been named vice president less than 2 years ago.

R. C. HOOD

L. C. McKESSON

A. C. POPE

Ansul also created a dual vice presidency. Sales Director Leonard C. McKesson was named vice president in charge of sales and Arthur C. Pope was elevated to vice president in charge of manufacturing.

Aramco Gets Fleet of Work Boats for Persian Gulf

Final unit of the fleet of work boats built by Fellows and Stewart for Arabian American Oil Co. is this 65-footer which performs as a combination fire, tug, and pilot boat

Arabian American Oil Co. has recently placed in operation on the Persian Gulf a fleet of high-speed work boats. Built by Fellows & Stewart at Terminal Island, Calif., and designed by Dair N. Long, the new boats are of welded-steel construction, powered with twin G.M. diesels of 200 hp. which, driving through 2 to 1 reduction gears, give them a cruising speed of 14.5 knots.

Two of the new Aramco fleet are 60-ft. personnel boats with a capacity of 81 seated passengers; one is a staff personnel boat with enclosed cabin that seats 54 passengers and two are unique multipurpose craft 65 ft. overall. The 60-footers will operate between Ras Tanura and Bahrein, carrying passengers, light supplies, and baggage. The 65-footers will serve as fire, pilot, and tug boats.

Ideco Announces Several Organization Changes

G. W. WALTON

International Derrick & Equipment Co. has recently announced a number of changes in its sales and service organization. The election of George W. Walton as executive vice president and as a member of the board of directors was announced by J. M. Gardner, president.

Following his election, Walton announced the addition of W. O. Timberlake, former general manager of Cardwell Manufacturing Co., to the Ideco technical service staff.

T. D. Collins, vice president, Ideco Supply Stores division, has announced the opening of a new oil field supply store at Snyder, Tex. C. W. Nichols has been appointed store manager,

and he will be under the direction of W. S. Nelson, district manager.

Walton formerly held the position of vice president in charge of Ideco machinery and export sales division. He joined Ideco in 1944 and prior to this he had first entered the oil business as a representative of National Supply Co. and later with Wilson-Snyder Manufacturing Co. Subsequently he joined Emsco as vice president and sales manager, and still later went with Unit Rig & Equipment Co. as sales manager.

Timberlake was graduated from Washington University in 1931 as a mechanical engineer. From 1931 until 1947 he served with Continental Supply Co., and in 1947 he joined Cardwell.

Oilwell Announces Five Changes in Sales Staff

Five personnel changes have been announced by U. S. Steel's Oil Well Supply Co. C. H. Maynard, manager, eastern division has announced three changes.

J. D. Walker, manager of Oilwell's Bradford, Pa., branch store since 1946, has been named field sales representative at that city and is succeeded as store manager by William F. Scott, Jr., formerly of the Bolivar, N. Y., store. Ray Mellring succeeds Scott at Bolivar.

F. D. Smith, Gulf Coast division manager, has announced the appointment of Clyde L. Curry as manager of the Harvey, La., store.

V. J. Waters, central Midwest division manager for Oilwell, has announced two promotions in the headquarters of the West Texas district at Midland, Tex. J. P. O'Toole, district engineer, has been named assistant district manager and will be in charge of sales and sales promotion.

Fluor Names Dieter and Nagel to New Positions

G. H. DIETER

J. P. Wiseman, vice president in charge of sales for Fluor Corp., Ltd., Los Angeles, has announced the appointment of George H. Dieter to general sales manager, Los Angeles, and R. E. Nagel to assistant sales manager, in charge of Fluor's Chicago sales office.

R. E. NAGEL

P. D. MELLON

At the same time it was announced that P. D. Mellon, Calgary, had recently been appointed Canadian representative for the company.

Dieter has been associated with Fluor since 1940 in such capacities as assistant project engineer, district sales engineer, and manager of manufacturing sales.

Nagel has been active in the petroleum industry since 1921 when he joined Universal Oil Products Co. He served with that company until 1945, at which time he joined the Fluor organization.

Presently associated with Calgary & Emerson Gas Co., Mellon has a background of 33 years in the gas industry. He will be the first permanent resident to represent Fluor in petroleum and allied industry design, engineering, and construction projects in western Canada.

Water Well Drilling Group Elects Officers

Texas Water Well Drilling Association has announced the election of new officers to serve for the year 1950.

Officers elected were: O. F. Jensen, vice president, Lane-Texas Co., president; B. J. Swinehart, Swinehart & Son Drilling Co., vice president; and George Ringstaff, Guaranteed Water Wells Co., secretary.

Named on the board of directors were: A. E. Fawcett, Texas Water Wells, Inc.; J. Frank Davis, Davis Water Well Co.; and H. H. Heiskell, Heiskell Water Well Co.

Maloney-Crawford Forms Canadian Affiliate

Maloney - Crawford Tank & Manufacturing Co., Tulsa, has formed Maloney - Crawford of Canada, Ltd., to handle its Canadian business, according to S. P. Wallace, president.

G. M. CHEATHAM

George M. Cheatham, Jr., who has been representing Maloney - Crawford in Canada, has been placed in charge of the Canadian firm. Headquarters are in Edmonton, Alta., Canada.

(Continued on page 127)

New York Chapter of Nomads Hold Annual Invitation Banquet

Members and guests at the annual invitation banquet held by the New York Chapter of Nomads heard Dr. Wilson Compton, president of Washington State University and a member of the United States delegation to the General Assembly of the United Nations, deliver the principal address of the evening. New York Nomads also recently held their tenth annual dinner dance at Hotel Biltmore. Attendance of 300 made the dinner dance the largest party ever sponsored by the chapter

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$12.00 a column inch one issue . . .
10% Discount three or more issues.

EQUIPMENT FOR SALE

FOR SALE: Lacoste-Romberg gravity meter complete with many accessories and in good operating condition. Available for immediate delivery. $3,000.00 f.o.b. Houston, Texas. Box D-309, The Oil and Gas Journal, Tulsa, Oklahoma.

HAVE 200,000 feet 7" 20# seamless casing range 2, J55. A.P.I. New prime. F.O.B. Pittsburg, price $129 per ton. A. H. Johnson, 1936 North Clark Street, Chicago, Ill., Phone MO-hawk 4-3200.

FOR SALE: 1 Model QSVSI Cardwell All Steel Single Drum Oil Well Servicing Skid Type Winch, Ser. No. QS-119 powered by Ford V-8 Engine Ser. No. BB18-4103910. Price $900.00. No mast. Contact J. C. Belt, Duncan, Okla., or write Cities Service Oil Co., Patridge, Bartlesville, Oklahoma.

FOR SALE: 76 Star Spudder SRK Waukesha Motor with or without tools, or trade for smaller spudder. D. B. Wilbur, Centralia, Illinois, P. O. Box 227.

NEW Byron Jackson "Pup" Centrifugal Pumping Units with Chrysler Ind-9 engines — Army surplus — export boxed with parts and tools—condition perfect—supply limited—price attractive—available for immediate shipment from Houston.

HALLORAN EQUIPMENT CO.
431 Kress Bldg. Ph. CA-1447
Houston 2, Texas

FOR SALE

12—230 H.P. Type 10 Bessemer New 17" Power Cylinders complete ready to run with 16" to 18" Compressors. 1—230 H.P. Clark Horizontal with Compressors. Located Salem, Illinois.

ENGLE PETROLEUM, Incorporated
Box 655, Evansville, Indiana

24,000 feet
New 4" O.D. Seamless

BOILER TUBES

20-22 ft. Random lengths
Plain ends, beveled for welding
Ideal for gas lines

Reconditioned
SEAMLESS TUBING
21,000 ft. 5½" O.D.
55,000 ft. 4" O.D.
75,000 ft. 3½" O.D.
55,000 ft. 2¼" O.D.
120,000 ft. 2" O.D.
95,000 ft. 1½" O.D.
Single or Double Random Lengths
Write—Wire—Phone

SONKEN-GALAMBA CORP.

2nd and Riverview (X-526)
Kansas City 18, Kansas THatcher 9243

EQUIPMENT FOR SALE

FOR CABLE TOOLS
DEGEN PIPE AND SUPPLY CO.
Box 107, Red Fork Station, Tulsa, Oklahoma

New Wire Rope at Money-Saving Values: Leading brands. Sizes ¼" to 1⅛". 6x19, 6x37, construction for all purposes. Degen Pipe & Supply Company, Box 107, Red Fork Station, Tulsa, Oklahoma.

ONE H. D. Failing 1500 Mtd. on New G.M.C. Drill pipe, tools, and accessories. Very cheap. P. K. Kelley, Ph. 54-9764, 208 N.W. 36th Street, Oklahoma City, Oklahoma.

FOR SALE: Two Fairbanks-Morse Diesel Engines, 150 H.P. Twin Cylinder, Horizontal Type. Completely overhauled. $1500.00 each. Melton Supply Co., Seminole, Okla.

FOR SALE: Two new welded propane tanks tested 200# cold water pressure, suitable for either propane or butane. Size 54" diameter x 37'6" long, mounted on welded oil field skids, complete with fittings. Tanks never used, located Southern Louisiana. Offered at bargain price. Wire or phone Bethlehem Supply Company, Tulsa, Oklahoma.

NATIONAL "50" Compound Double Drum Rig 126' Cantilever Ideco Mast, 10' substructure, 6,000' 4½" drill pipe, this rig complete and in excellent condition. P.O. Box 205 Sta. B, Bakersfield, California.

Several Army Surplus 4½" x 6" Gaso Duplex 1860 Pumps — two piece skid mounted with Chrysler 8 cylinder engines. Will sell pumps only or complete units about half price.

H. H. COFFIELD
ATTN: W. H. Orr
Phones: 132—Rockdale, Texas
A-86064—Houston, Texas

NEW PIPE FOR SALE

(Subject to Prior Sale)

5000 Ft. 9⅝", 36#, J55, Range 2, 8 Rd. Thrd. Seamless Casing
4000 Ft. 8⅝", 28# Ditto
19,000 Ft. 6" Std. Byars L.W. W.I. Pipe

Specification ASTM-AF2-33

Contact

National Cooperative Refinery Assn.
Phone 820 McPherson, Kansas

EQUIPMENT FOR SALE

ROLAGRIP COUPLINGS—For Sale, 100 tons, 1½" to 8" inclusive. New, never used, complete with bolts and neoprene gaskets. Price 50% less than manufacturers selling price. Send for list. JULIUS M. FOGELMAN, Reading, Pa.

FOR SALE: At Craig, Colo., 828' of 6⅝" OD 24# 8 RT R 2 and 3 J-55 ST&C New Seamless Steel Casing $1.94 per foot. 787' of 10¾" OD. 40.50# H-40 R2 ST&C Seamless Steel New Casing $3.13. Cities Service Oil Co., Patridge, Bartlesville, Oklahoma.

PACKAGED H_2S REMOVAL UNITS

We offer prompt shipment on skid-mounted hydrogen sulfide removal units for treating sour gas for pipe line or fuel gas purposes.

GRAFF ENGINEERING & EQ'PT. CO.
3415 Westminster, Dallas 5, Texas

FOR SALE (Subject to Prior Sale)

50' of 13⅜" Smls. Drive Pipe; 765' of 14" 57# Smls. Drive Pipe; 408' of 10" 32# Smls. Casing; 6196' of 8" 24# Smls. Casing; 6400' of 7" 23# Smls. Casing; 12000' of 7" 20# Smls. Casing; 7798' of 3" 9.20# Smls. Tubing; 5639' of 2½" E.U.E. Smls. Tubing; 9625' of 2" Reg. 4.6# Pgh. H-40 J-55 Smls. Tubing; 2 100 Bbl. bolted tanks knocked down in original crates; 11 5" Orbit gate valves 3000 lb. test. Interested Parties contact M. B. Belden, Office 425—2nd St. N.W., Canton 2, Ohio. Telephone 4-6147.

BARGAIN

Two **new** Model 6NKU-6NK-20-S "Waukesha" Oilfield Power Units. Latest type—7" x 8½", 225 h.p., equipped with Twin Disc power takeoff, gas pressure gauge, safety magneto, 1 CKU starting unit, radiator cooled. Can be used with butane, natural gas, or gasoline.

Cost $6799 each; will sell for $5835 each, f.o.b. Cut Bank, Montana.

Central Machinery Co.

Your "Caterpillar" Distributor
Great Falls, Montana

USED PIPE FOR SALE

200,000'—8" Line Pipe, cleaned and beveled.
50,000'—6" Line Pipe as taken from ground.
5,840'—18" Line Pipe as taken from ground.
13,800'—20" Line pipe as taken from ground.

Interested parties contact:

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1684 Wiltshire Blvd. Huntington, West Virginia Phone 2-8762

EQUIPMENT FOR SALE

1942 FORD Ferguson Tractor, Acetylene and Electric Welding. Sold new $3,200. Will sacrifice for $895. Phone 26287, Evansville, Indiana.

ONE 8'x27½ Type XYCP National Emulsion Treater complete. Never used, located Basin, Wyoming. Considerable reduction. Write Box 754 or phone 93193, Billings, Montana.

FOR SALE
BOILERS
STATIONARY
160# WP—504 HP—with State inspection certificate.
MUST SACRIFICE!
WESTERN STEEL CUTTING, INC.
Dept. 25, P.O. Box 31, Bell, Calif.
Ph.: Los Angeles—LOgan 8-2188

FOR SALE

7500' of 5½" 13# lap weld used casing, Cunningham, Kansas.

10,000' of 3½" used line pipe, Oklahoma City, Oklahoma.

5,000' of 7" casing used for line pipe, Charleston, W. Va.

ROGERS AND WRIGHT, INC.
710 Peoples Bldg., Charleston, W. Va. Phone 3-0171
215 Wright Bldg., Tulsa, Oklahoma Phone 5-3229

FOR SALE

5—Hyster Model FMI Front mounted single drum Winches Worm Driven. Will fit Caterpillar D2 or D7 Tractors, and work in conjunction with Trackson MD6 or MD7 Pipelayers—A1 condition.

JOHN FABICK TRACTOR COMPANY
3100 Gravois, St. Louis, Mo.
Phone—LA. 8900, L.D. #5

WATCH THIS SPACE FOR OUTSTANDING WEEKLY VALUES

BOILERS

3—1000 HP, Vogt, class VR, bent tube, water tube boilers, 300 lb. PSI, capacity 60,000 lbs. steam per hour, complete with Foster-Wheeler superheater, natural gas fired, ASME code. Used less than 2 years after installation in 1943.

2—800 HP, Babcock & Wilcox, integral furnace, type FF-16-44, water tube boilers, 200 lbs. PSI, capacity 54,000 lbs. steam per hour, natural gas fired, forced draft. Each boiler equipped with B. F. Sturtevant, size 100, design 7, class III, fans. Driven by Worthington-Moore steam turbine. Used less than 2 months after installation in 1946.

DULIEN STEEL PRODUCTS, INC.
of Washington
P. O. BOX 667
COTTON VALLEY, LA.
PHONE: COTTON VALLEY 26

EQUIPMENT FOR SALE

FOR SALE—NEW PIPE
420 Ft. 12" Std. 49.56# 3/8" wall. 340 Ft. 8" extra strong 43.38# 1/2" wall. New seamless plain end pipe, low price. Exner-Dodge, Inc., Coffeyville, Kansas.

FOR SALE: Approximately 25 miles 4" OD plain end pipe in line. Public Service Corp. of Texas, 902 Burk Burnett Bldg., Fort Worth, Texas.

FOR SALE: One 6-DT-317 and one 4-DC-645 Buda Diesel Engine. New engines at 25% off factory list. R. A. Young & Son, Inc., Fort Smith, Arkansas.

FRANKS Senior Well Servicing Unit with 8 x 10 inch, 50 foot mast. On Dodge truck. Location—California. Write Box D-324, The Oil and Gas Journal, Tulsa, Oklahoma.

FOR SALE—At Houston, 105,000' of 6" 12.89# Plain End Bevelled Republic Electric Weld #1 Used Line Pipe. Double random lengths. Cities Service Oil Co., Patridge, Bartlesville, Okla.

DIESEL ENGINE REPAIR
AND
HEAVY MACHINE SHOP
FOR SALE

Consisting of land, buildings, machinery, equipment, cars and trucks. Established in central United States over forty years.

For Complete Details Write

BOX D-320
THE OIL AND GAS JOURNAL
Tulsa, Oklahoma

EQUIPMENT WANTED

WANTED: Portable trailer or truck mounted Rotary suitable for 2500' drilling. Wish to exchange 1500' truck mounted rotary and pay difference. No junk. Box 378, Cherryvale, Kansas.

WANTED: Two Sweetland Presses; Size #3 to 7 inclusive. Also, Oil Canner. Oklahoma Refining Company, Box 1265, Seminole, Oklahoma.

HELP WANTED

Assistant Advertising Manager

WITH a large eastern manufacturing company. Should be in his 30's, with technical education, preferably in Petroleum Engineering, Mechanical Engineering or Chemistry. Candidate should have had industrial advertising experience. Knowledge of petroleum or automotive industry desirable.

Excellent opportunity for a man with advertising and promotion experience in these industries. Give complete resume of education, experience and salary to

Box D-323,
The Oil and Gas Journal,
Tulsa, Oklahoma

HELP WANTED

EXPERIENCED seismologist for work in division office. Must be capable of highest type seismic interpretative work. Permanent position. Good future. Give full details of education, experience, age, and availability in first letter. All replies held confidential. Address Sun Oil Company, attention L. G. Ellis, Box 2831, Beaumont, Texas.

NEW foreign and domestic Oil Employment Directory. Over 500 listings in drilling, production, refining, natural gasoline, pipe lines, geological, exploration, supplies, manufacturers, services; and trucking, refinery and pipe line contractors, showing where to apply for jobs. Price $5.00. Oil Industry Mailing List, Box 2603, Tulsa, Okla. (Our 28th year).

WANTED: Graduate Petroleum Engineer for work in Mexico. Minimum five years' experience in completion and production of flowing wells. Knowledge of Spanish desirable. Salary open, depending on experience. Box D-305, The Oil and Gas Journal, Tulsa, Oklahoma.

WANTED: Civil Engineer capable of registering in any Southern State including Florida. Experience on Natural Gas Distribution Systems preferred. Address: Littrell Engin. & Constr. Co., Inc., Moultrie, Georgia.

SITUATIONS WANTED

GAS ENGINEER: 10 years general experience in design, construction and operation of gas gathering and processing plants. 37 years old. Married and settled. Excellent references. Box D-327, The Oil and Gas Journal, Tulsa, Oklahoma.

ATTENTION: Well established oil well drilling contractor desires to manage and supervise: Individuals', groups', small or medium-sized oil companies' drilling, production and operating problems in Central and Western Texas and New Mexico. Personal interview by appointment is desired. Makin Drilling Company, Box No 131, Ph. No. 131, Hobbs, New Mexico.

PRODUCTION Superintendent, graduate petroleum engineer, 36, experienced all phases drilling, completion, production. Desire responsible connection with active organization. Excellent references. Box D-295, The Oil and Gas Journal, Tulsa, Oklahoma.

DESIRE EMPLOYMENT: Experience in gas measurement, pipeline operations, land and lease, survey and oil field construction. 32, reliable, salary $250 month. Box 1393, Sapulpa, Oklahoma.

PETRO. ENGINEER-ATTORNEY: 31, B.S. Pitt. '40, three years' experience, major oil company, three years Navy petroleum inspection; LL.B. Mich. '49, recently passed Pa. bar exam. Desires opportunity in oil industry utilizing education and experience. Anything, excepting patent law. Box D-319, The Oil and Gas Journal, Tulsa, Oklahoma.

EXPERIENCED Office and Credit Management, Purchasing, Sales, Personnel and Administrative Work. Industrial and Oil Field Supplies. Presently employed Houston, but willing to move. Seek greater responsibility and opportunity. Excellent references. Write Box D-321, The Oil and Gas Journal, Tulsa, Okla.

DESIRES broader knowledge of oil industry. Seismograph computer and interpreter wants connection with established operator, geologist or small production company. Geological degree, also major college work physics and C.E. Details on request. Box D-326, The Oil and Gas Journal, Tulsa, Oklahoma.

FOR SALE

TRUCK LETTERING AND TRADEMARK DECALS made for your trucks and equipment. Easy to apply, uniform, distinctive, economical for small or large needs. Write for catalog. MATHEWS COMPANY, 827 S. Harvey, Oak Park, Illinois.

FOR SALE: Installation of steel shelving in our legal department creates surplus of used oak bookcases. Full details upon request. Cities Service Oil Co., Patridge, Bartlesville, Okla.

ROYALTIES

DEEDED ROYALTIES
San Juan Basin & Permian Basin. Write Harry S. Wright, Wright Bldg., Farmington, New Mexico.

LEASE AND DRILLING BLOCKS

OIL LANDS available Western Canada. Freehold leases and reservations from one hundred and sixty to one million acres. Reference—any bank in Toronto, Ontario. Gordon Jones, 200 Bay Street, Toronto, Canada.

EXTRA well located Great San Juan Basin, New Mexico. 11,000 acres, ten year leases 25c acre rentals. All one lease. $2.50 acre, small oil payment. Opportunity, lifetime. Box D-304, The Oil and Gas Journal, Tulsa, Oklahoma.

FOR SALE: Oil lease, partially under water flood. 900 acres under lease, of which 320 acres proven productive. Located Southeast Kansas. P. O. Box 31, Chanute, Kansas.

SEE A. L. BOWLES, ADA, OKLA., FOR DRILLING DEALS, LEASES, ROYALTIES

HAVE Kansas Water-flood prospect. Producing natural since 1911. Would like to hear from parties that would be interested in taking exploratory cores. Box 508, Emporia, Kansas.

SCURRY COUNTY ROYALTIES

Send for list of choice Scurry County royalties. Also have few townsite lot leases $300. Navarro Royalties Company, Odessa, Texas.

WANTED!
FARMS AND ACREAGE

OIL Leases wanted—Mineral rights in Scurry County, Texas. Also surrounding counties. Box D-322, The Oil and Gas Journal, Tulsa, Oklahoma.

LEASES ROYALTIES

Producing and Nonproducing

Bought and Sold—Any Area

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Equipment Men

(Continued from page 124)

Luria Engineering Names Karp as Chief Engineer

M. A. KARP

Milton A. Karp has been appointed chief engineer of Luria Engineering Corp., New York City, designers and fabricators of standard, steel-frame industrial and commercial buildings.

In announcing this appointment, Herbert B. Luria, president, stated that Karp will head Luria's enlarged engineering department, which is being moved to the company's rapidly expanding plant in Bethlehem, Pa. He was formerly chief engineer for Ellis Wing Taylor, prominent West Coast industrial designers.

Peter A. Strobel, vice president in charge of engineering, will continue to be located at the company's executive headquarters in New York City.

Bialock Promoted by National Tube Co.

Harry L. Bialock, manager of sales of National Tube Co., has been promoted to manager of sales of the tubing specialties division. He will make his headquarters at Gary, Ind., and succeeds David T. Marvel, who has resigned.

Charles J. Lundvall, now a salesman in the New York district office of National Tube, has been appointed manager of sales at Atlanta, to succeed Bialock.

Bialock has been with National Tube since 1936, when he became a salesman in the New Orleans office. Later he was appointed manager of sales there. He was a tubing-specialty representative in Washington, D. C., during the war, holding that position until he was named sales manager in Atlanta.

He is a graduate of Washington University law school, St. Louis. Lundvall has been with the company since 1926, and has been a salesman and field engineer since 1930. He attended Northwestern and Iowa State universities.

Electric Products Names Houston Representative

Electric Products Co. has appointed William E. Brice Co., Houston, as district representative for Southern Texas. William E. Brice is a graduate electrical engineer from Rice Institute. In addition to his industrial experience with the General Electric Co., Houston Lighting & Power Co., and Wilson Electric Equipment Co., he is acquainted with the oil-field and refinery operations.

The Brice company will handle the Electric Products Co. line of battery chargers, electrolytic equipment, synchronous and induction motors, frequency changers, a.c. and d.c. generators, and industrial dynamometers.

McCullough to Represent For Alexander String Shot

McCullough Tool Co., Los Angeles, has announced its appointment by Ford Alexander as a licensed service representative for the Ford Alexander String Shot, effective in all states after January 10.

The String Shot is used for backing off or unscrewing drill pipe. It can also be used for unscrewing collars and in certain cases, for unscrewing washover pipe. The backoff method of recovering stuck pipe has become a valuable aid in fishing.

I. J. McCullough, president, has also announced the appointment of Herman E. Schaller to its staff of sales engineers. Schaller, formerly division sales manager of the Rocky Mountain, Mid-Continent division of Eastman Oil Well Survey Co., received his master's degree in petroleum engineering from University of Southern California in 1947.

The recent appointment of McCullough as service representative for Ford Alexander allows McCullough to use the method in conjunction with the Magna-Tector to locate the stuck joint.

Oliver United Filter Makes Important Changes

C. W. CRUMB

GLEN G. REED

R. Gordon Walker, vice president and general sales manager, Oliver United Filters, Inc., has announced the appointment of C. W. Crumb, formerly manager of the company's Chicago office, as sales analyst. He will work directly with Walker on an intensive study of all markets in the United States.

Glen G. Reed, who for some time has worked out of the Chicago office, will take over the duties as manager of sales in that territory. Reed has been directly identified with filtration problems for many years and is well qualified for the new position.

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CALENDAR OF EVENTS

January

Society of Automotive Engineers, annual meeting Hotel Book-Cadillac, Detroit, January 9-13.

February

Southern Gas Association, meter and regulator conference, Houston, February 9-10.

American Institute of Mining and Metallurgical Engineers, annual meeting, Hotel Statler, New York, February 12-16.

American Institute of Chemical Engineers, regional meeting, Houston, February 26-March 1.

American Society for Testing Materials, spring meeting, Hotel William Penn, Pittsburgh, February 27-March 3.

March

American Petroleum Institute, Division of Production, Southwestern District meeting, Adolphus Hotel, Dallas, March 8-10.

Indiana Independent Petroleum Association, spring convention, Hotel Severin, Indianapolis, March 9-10.

North Texas Oil and Gas Association, Kemp Hotel, Wichita Falls, March 25.

Southern Gas Association, Galveston, Tex., March 27-29.

Western Petroleum Refiners Association, annual meeting, Plaza Hotel, San Antonio, March 27-29.

American Petroleum Institute, Division of Production, Mid-Continent district meeting, Skirvin Hotel, Oklahoma City, March 29-31.

April

National Association of Corrosion Engineers, annual conference, Jefferson Hotel, St. Louis, Mo., April 4-7.

American Society of Mechanical Engineers, Hotel Statler, Washington, D. C., April 10-14.

Southwestern Gas Measurement Short Course, University of Oklahoma, Norman, Okla., April 11-13.

National Petroleum Association, Hotel Cleveland, Cleveland, Ohio, April 12-14.

American Petroleum Institute, Division of Production, Rocky Mountain district meeting, Gladstone Hotel, Casper, Wyo., April 13-14.

Natural Gasoline Association of America, annual convention, Texas Hotel, Fort Worth, April 24-26.

Oil Heat Institute of America and National Oil Heat Exposition, annual meeting, Commercial Museum, Philadelphia, April 24-May 1.

American Petroleum Institute, Division of Production, eastern district meeting, Cleveland Hotel, Cleveland, April 26-28.

May

American Petroleum Institute, Division of Refining, midyear meeting, Hotel Cleveland, Cleveland, May 1-4.

Interstate Oil Compact Commission, spring meeting, Biloxi, Miss., May 4-6.

Independent Petroleum Association of America, midyear meeting, Biltmore Hotel, Los Angeles, May 7-9.

National Stripper Well Association, Biltmore Hotel, Los Angeles, May 7-9.

American Gas Association, Natural Gas Department, spring meeting, Mayo Hotel, Tulsa, May 8-9.

Liquefied Petroleum Gas Association, annual convention, Palmer House, Chicago, May 8-11.

American Petroleum Institute, Division of Production, Pacific Coast district meeting, Biltmore Hotel, Los Angeles, May 11-12.

American Gas Association, production and chemical conference, Hotel New Yorker, New York, May 22-24.

American Institute of Chemical Engineers, regional meeting, New Ocean House, Swampscott, Mass., May 28-31.

June

National Oil Scouts and Landmen's Association, Skirvin Tower Hotel, Oklahoma City, June 8-10.

American Society of Mechanical Engineers, oil and gas power division, Lord Baltimore Hotel, Baltimore, June 12-16.

American Society of Mechanical Engineers, Hotel Statler, St. Louis, June 19-23.

Pennsylvania Grade Crude Oil Association, Hotel William Penn, Pittsburgh, Pa., June 15-16.

Canadian Gas Association, annual convention, Manior Richelieu Hotel, Murray, Quebec, Canada, June 20-24.

American Petroleum Institute, midyear division of production and standardization conference, Brown Palace Hotel, Denver, June 26-30.

American Society for Testing Materials, annual meeting Chalfonte-Haddon Hall, Atlantic City, N. J., June 26-30.

August

Interstate Oil Compact Commission, summer meeting, French Lick, Ind., August 3-5.

September

American Society of Mechanical Engineers and Instrument Society of America, Municipal Auditorium, Buffalo, N. Y., September 11-15.

National Petroleum Association, Hotel Traymore, Atlantic City, N. J., September 13-15.

American Society of Mechanical Engineers, petroleum mechanical engineering conference, Roosevelt Hotel, New Orleans, September 25-27.

October

American Gas Association, annual convention, Atlantic City, N. J., October 2-6.

Mid-Continent Oil and Gas Association, Texas division, Dallas, October 4-5.

American Association of Oilwell Drilling Contractors, annual meeting Mayo Hotel, Tulsa, October 9-10.

November

American Petroleum Institute, annual meeting, Biltmore and Ambassador Hotels, Los Angeles, November 13-16.

American Society of Mechanical Engineers, Hotel Statler, New York, November 26-December 1.

NOMADS

Tulsa Nomads, third Friday of each month. After Five Room, Tulsa Hotel.

Dallas Nomads, first Monday of each month, Texas Room, Baker Hotel.

Houston Nomads, second Monday of each month. Ye Ole College Inn, Houston.

Los Angeles Nomads, second Wednesday of each month, Jonathan Club.

New York Nomads, election and business meeting, Louis Sherry's, January 9.

Asphalt Demand Rises

Demand for asphalt totaled 39,284,000 bbl. in the first 9 months of 1949, an increase of 30,000 bbl. from the corresponding period in 1948, the U. S. Bureau of Mines reported. The gain occurred in export demand, and domestic demand amounted to 38,096,000 bbl. as compared with 38,945,000 bbl. in the 1948 period. Exports totaled 1,973,000 bbl. against 1,816,000 a year ago. Production of asphalt totaled 37,361,000 bbl. compared with 39,241,000 in the year-earlier period.

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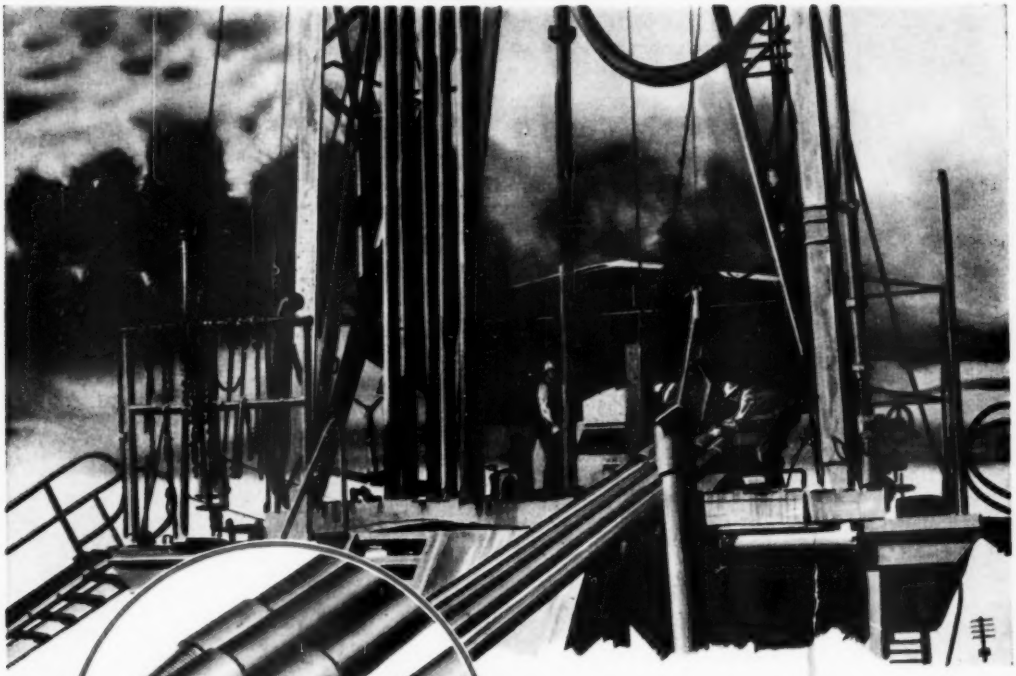

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